Fall 10-1954

Volume 66 - Issue 1 - October, 1954

Rose Technic Staff
Rose-Hulman Institute of Technology

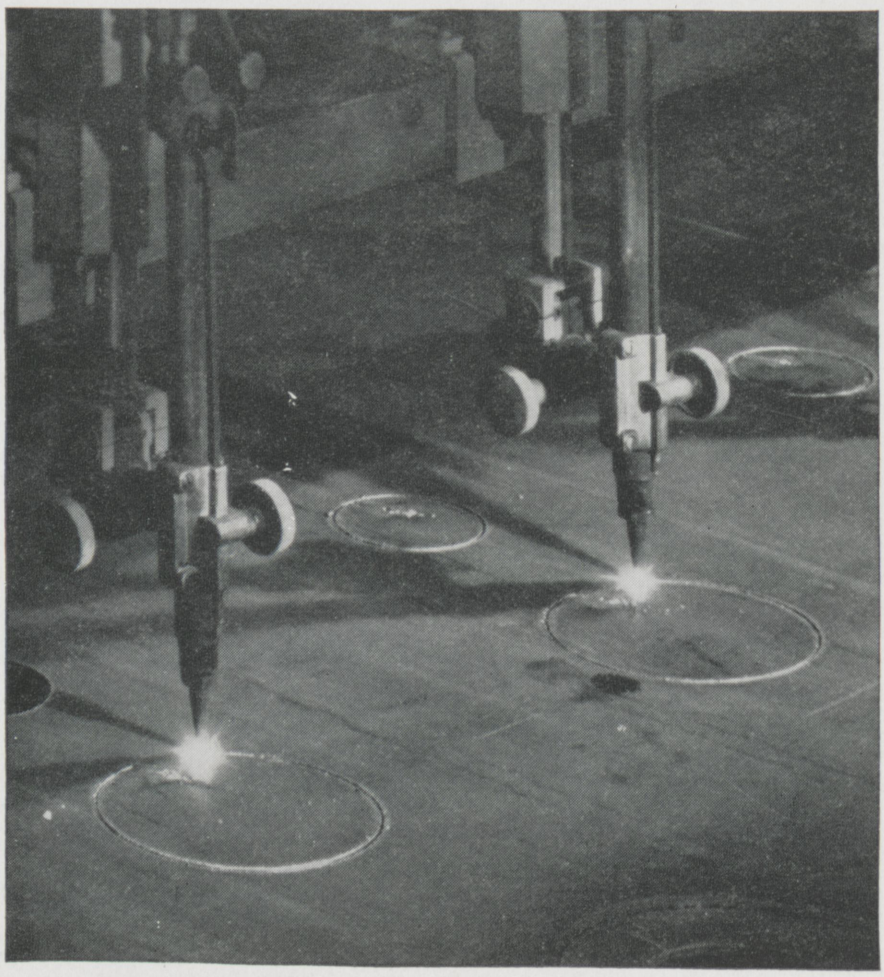
Rose Technic

Member Engineering College Magazines Associated

Homecoming Issue

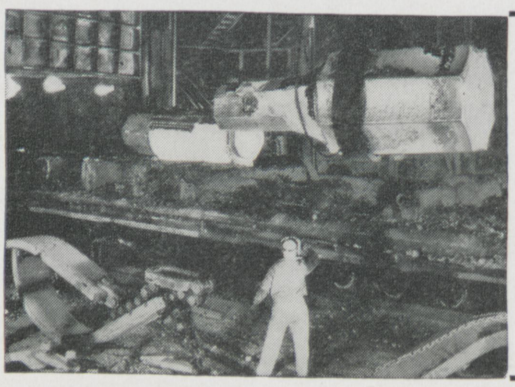
October 1954

Only STEEL can do so many jobs so well



Cuts Steel Like Butter! This modern flame-cutting equipment, in use at U. S. Steel Supply Division warehouses, can follow the most complicated patterns accurately and turn out finished shapes of steel exactly as wanted. Many fabricators of steel products buy their steel from U. S. Steel Supply, and have it cut to shape before it is delivered to them.

The Spring's The Thing that gives a Trampoline its unique place in the world of exercise and entertainment. Around the edge of the resilient "bouncing" surface, more than 100 oil-tempered springs, carefully designed and precisely manufactured by U.S. Steel, quietly go about their jobs of supplying the "motive" power that enables a performer to bounce and leap as high as 26 feet.



A 42-Foot Car-Bottom Furnace heats big steel ingots like this up to forging temperature at U.S. Steel's Homestead Works. But proper heating involves a great deal of skill and experience on the part of the men who supervise the process. And U.S. Steel Forgings Division craftsmen are second to none in expertness at their various jobs. Many of them learned their skill from fathers and grandfathers who held the same jobs before them.

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For further information on any product mentioned in this advertisement, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

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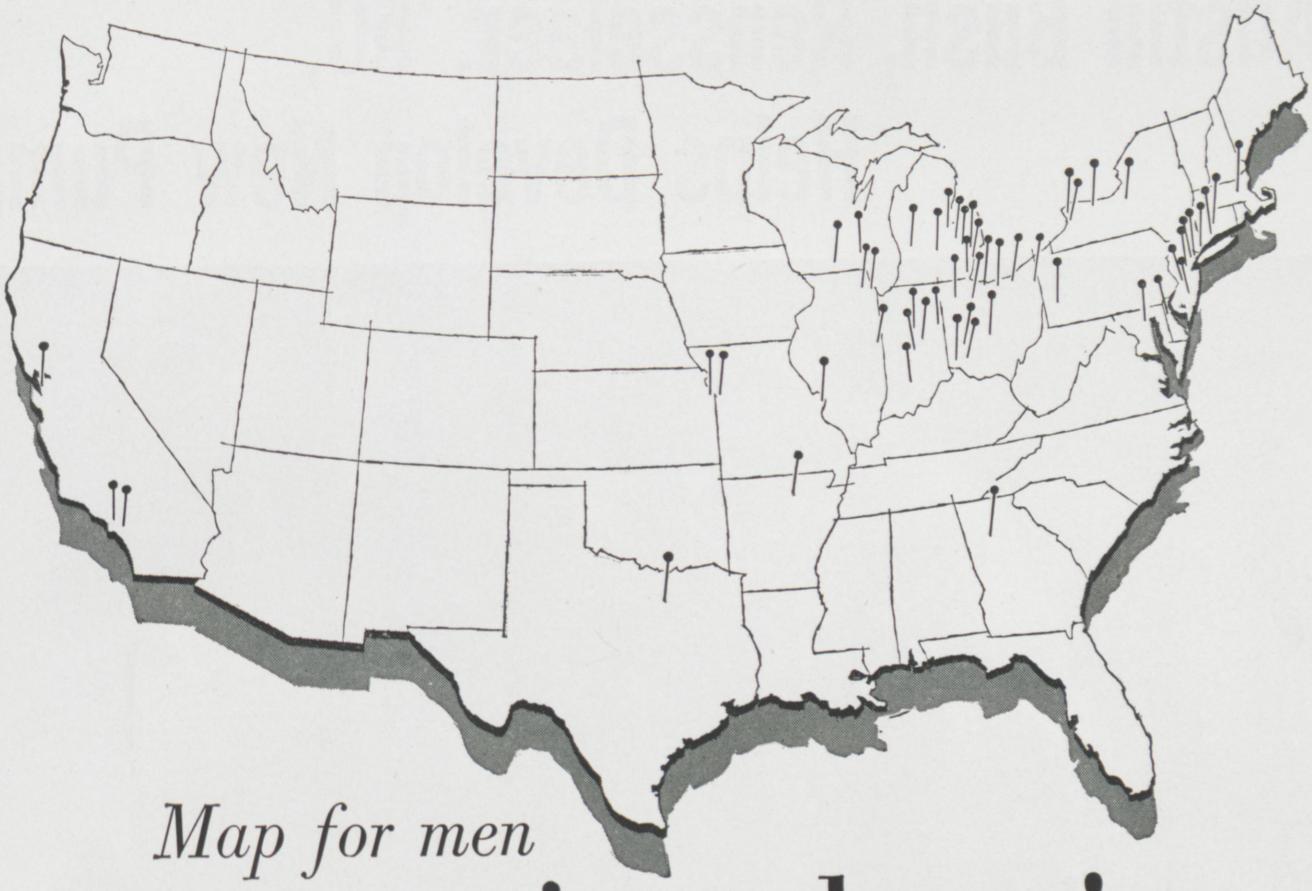

Map for men

going places!

EACH dot represents a city or town where at least one of the 116 General Motors plants is located.

These 116 plants—representing GM's 35 manufacturing divisions—provide a wide range of places in which you, as a young graduate engineer, might be working.

Each of these widely scattered plants offers the security and prestige of the GM name.

On top of that, each division has available to it the vast research facilities for which GM is famous.

In addition, we offer the scope of an organization which produces not only motorcars and their accessories, but also jet engines, refrigerators, electronic equipment, Diesel engines—just to name a few.

And most important is GM's deep-seated respect for engineering and engineers—the recognition of creative thinking that means "more and better things for more people."

You'll find plenty of wide-open spaces at GM if you can measure up to the chance and the challenge we offer. Why not start mapping it out in your mind?

Meanwhile, send for the booklet, "The College Graduate and General Motors," which goes into further detail concerning opportunities at GM.

GM POSITIONS NOW AVAILABLE IN THESE FIELDS:

MECHANICAL ENGINEERING
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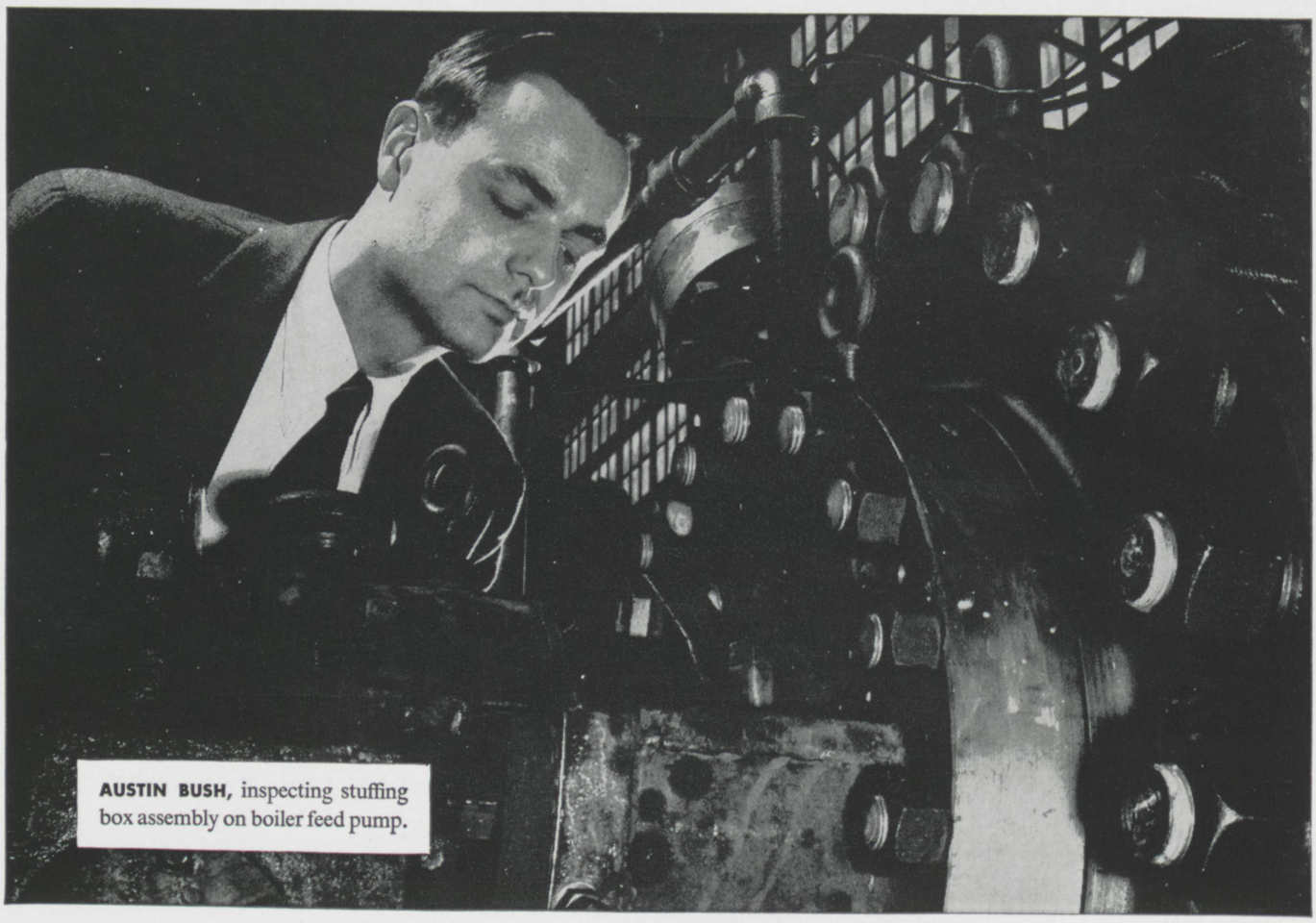
INDUSTRIAL ENGINEERING
CHEMICAL ENGINEERING

GENERAL MOTORS CORPORATION

Personnel Staff, Detroit 2, Michigan

Austin Bush, Rensselaer, '50, Helps Develop New Pump



AUSTIN BUSH, inspecting stuffing box assembly on boiler feed pump.

Reports interesting project engineering assignments at Worthington

"Despite its size as the leading manufacturer in its field," says Austin Bush, "I have found Worthington pays considerable attention to the interests of the individual. The company's excellent training program consists of several months of working with the various types of equipment manufactured, augmented by technical lectures, and talks on the organization of the corporation.

"Following this training, I was given an opportunity to choose the department in which I wanted to work—engineering, sales, or manufacturing. My choice was the engineering department where I have already been assigned to several interesting projects.

"In addition to the training program, the members of our engineering department hold monthly seminars at which engineering topics of general interest are discussed.

"Opportunities for advancement are good, and pleasant associates make Worthington a fine place to work."

When you're thinking of a good job, think *high*—think *Worthington.*

FOR ADDITIONAL INFORMATION, see your College Placement Bureau or write to the Personnel and Training Department, Worthington Corporation, Harrison, New Jersey.

WORTHINGTON

The Sign of Value Around the World

2.54X

Rose Technic

VOLUME LXVI, NO. 1 OCTOBER, 1954

Contents

Frontispiece

Shown in the picture is a workman inspecting the windings of a stator of a 44,000 kilowatt steam turbine-generator unit soon to be installed in the Lone Star Station of Southwest Gas and Electric Company by the General Electric Company. Courtesy of General Electric.

The Cover

On the cover is the Rose Polytechnic Student Center recently built to serve the students during their leisure hours. This building is to be the nucleus of an ultra-modern recreation center that houses all the extra-curricular organizations on campus. Rose Technic Photography Staff.

PHOTO CREDITS: Pages 13 and 36, North American Aviation; Page 12, Westinghouse Electric Corporation; Page 36, General Motors Corporation.

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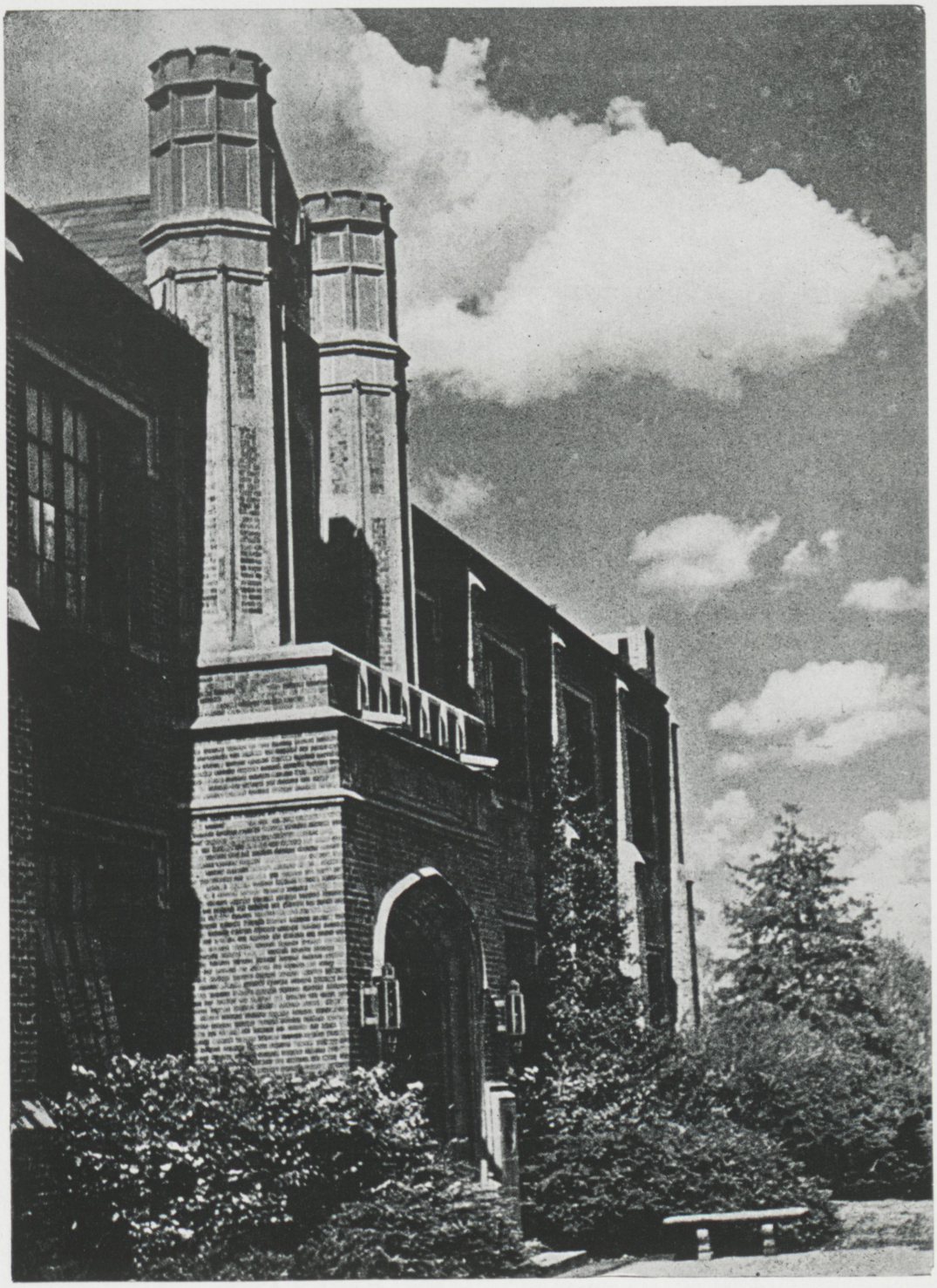

HIGH SCHOOL GRADUATES OF 1954

You are cordially invited to visit Rose Polytechnic Institute during the present school year to learn more about your college entrance and the highly accredited engineering courses available to you at Rose. The next freshman class will be admitted September 12, 1955.

OFFICE OF ADMISSIONS

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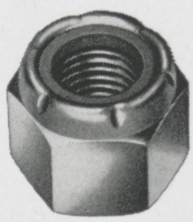
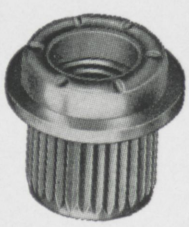
self-locking fasteners

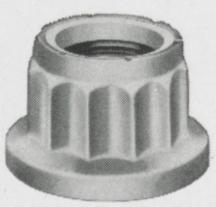
Elastic Stop nuts



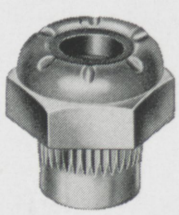
HEX NUT



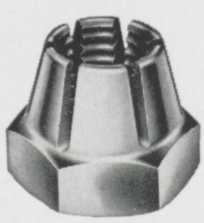
SPLINE NUT



HIGH TENSILE NUT

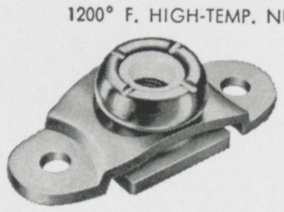


CLINCH NUT



1200° F. HIGH-TEMP. NUT

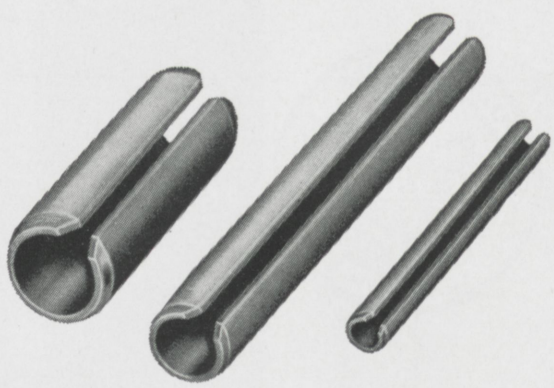
GANG CHANNEL NUTS



FLOATING ANCHOR NUT

Every major aircraft now being assembled relies on the vibration-proof holding power of ELASTIC STOP nuts. Only ESNA manufactures a complete line of all types and sizes of self-locking nuts.

Rollpins



dia. from 1/16" to 1/2"

Rollpins are slotted, tubular steel, pressed-fit pins with chamfered ends. They drive easily into holes drilled to normal tolerances, compressing as driven. Extra assembly steps like hole reaming or peening are eliminated. Rollpins *lock* in place, yet are readily removed with a punch and may be reused.

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Please send me the following free fastening information:

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- ☐ Rollpin Bulletin
- ☐ AN-ESNA Conversion Chart
- ☐ Here is a drawing of our product. What fastener would you suggest?

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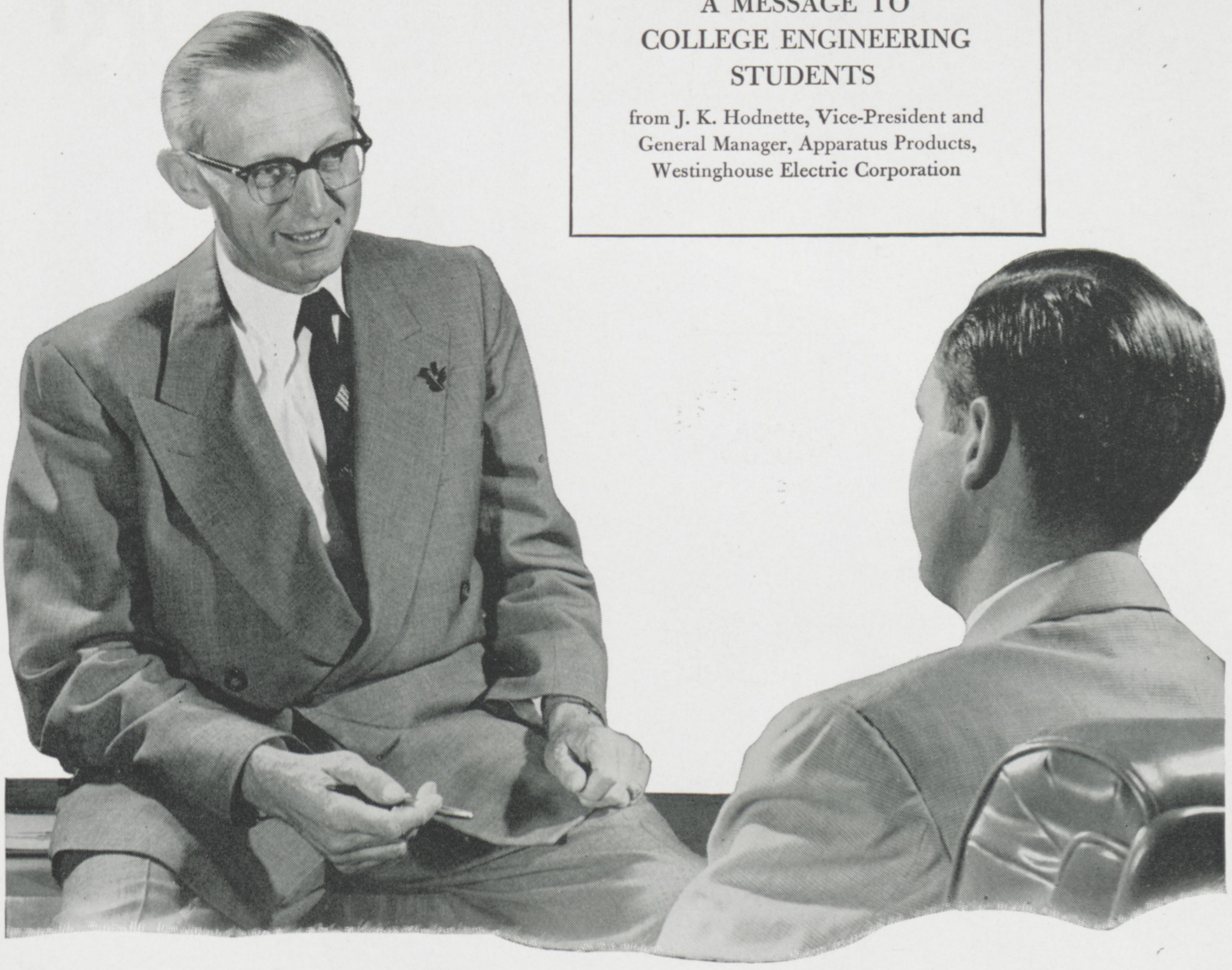
A MESSAGE TO COLLEGE ENGINEERING STUDENTS

from J. K. Hodnette, Vice-President and General Manager, Apparatus Products, Westinghouse Electric Corporation



To the young man with a vision of success

Success means different things to different men. It can mean professional recognition, or great achievement, or exciting work, or many other things. Whatever its special meaning to you—keep its image in your mind, for you are already well on the way to achieving it!

If you are *determined* to become a research scientist, you *can* be. If you have a burning ambition to become a sales engineer, you can be. If you have your sights set on a top executive spot, you'll be there someday. One might think a large company like Westinghouse would have more pressing things to think of than the ambitions of its young engineers. On the contrary, nothing is more important . . . for our professional people are our biggest asset.

Here at Westinghouse, intensive efforts are made to help our professional men realize their individual goals —through extensive training programs, study programs leading to advanced degrees, leadership programs, and guidance in professional development. You are treated as an individual at Westinghouse.

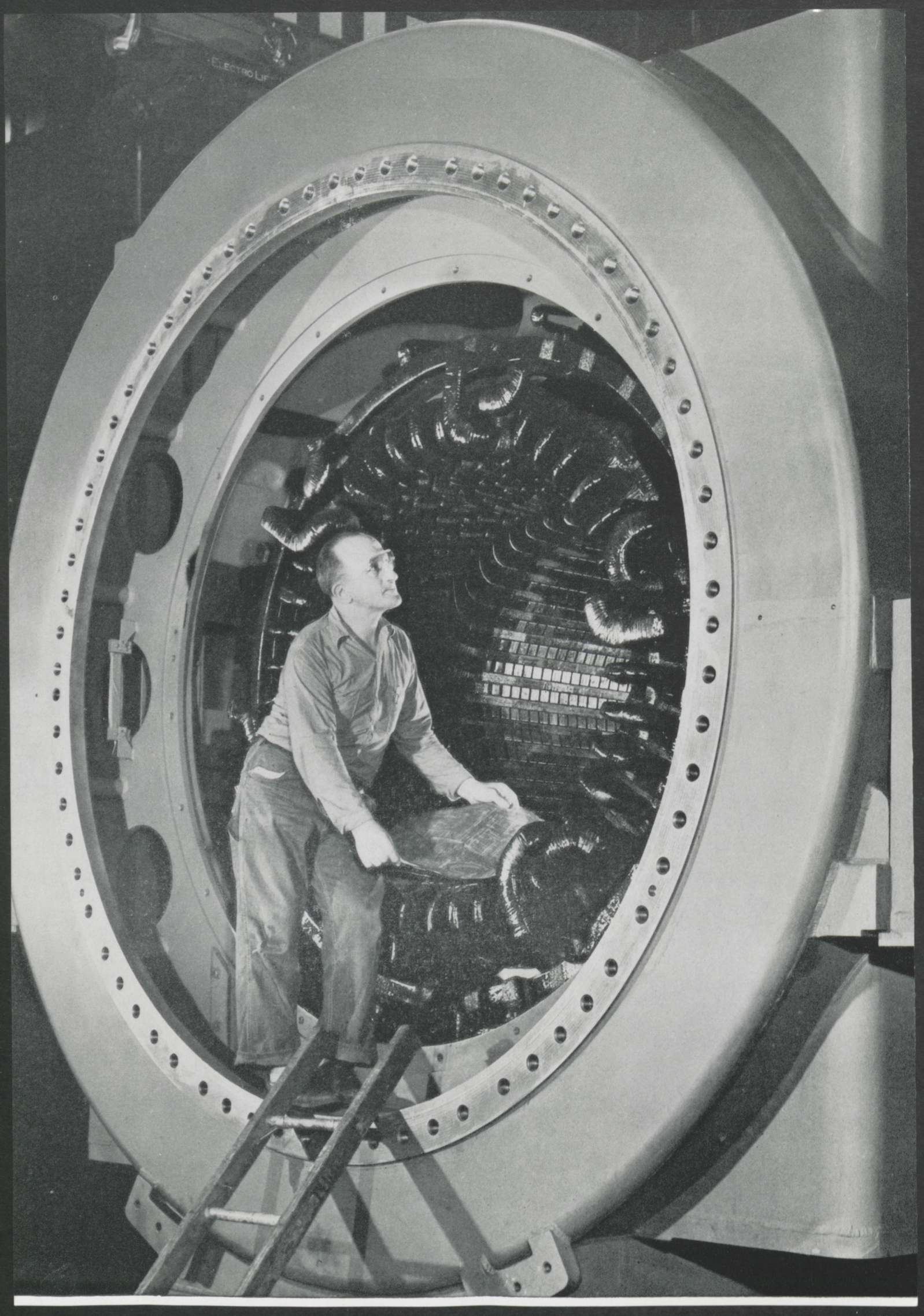
If you have the will, and are prepared, we can show you the way.

G-10271

YOU CAN BE SURE...IF IT'S Westinghouse

For information on career opportunities with Westinghouse, consult Placement Officer of your University, or send for our 34-page book, *Finding Your Place in Industry.*

Write: Mr. C. W. Mills, Regional Educational Co-ordinator, Westinghouse Electric Corporation, Merchandise Mart Plaza, Chicago 54, Illinois.



To the Class of '58

First, we would like to extend to you a hearty welcome from the upperclassmen. The rest of this note may be considered advice. While advice is supposed to be something that everyone likes to give and no one likes to take, this is one giving that certainly won't be enjoyed. It won't be enjoyed because it shouldn't be necessary.

A few days ago Mr. Kelly put an announcement on the board concerning intramural football. Within a couple or three days enough men had signed up to make several teams. Conspicuous in their absence, however, were the three or four teams usually fielded by freshmen in intramural sports. In fact, only a handful of freshmen displayed interest. A handful in a hundred and forty!!

This is by no means a solitary example. Indeed, we are sorry to say, it has become the common practice for the freshmen to ignore all extra-curricular activities, the organizations and publications as well as intramurals and athletics. An interesting correlation could be drawn between the attitude of the present freshmen and the death of hazing, but that's another story.

Finally, frosh, we would like to make a suggestion, not only for your sake but also for that of Rose. Now that you've been around for awhile and have gotten to know some of the upperclassmen, why not pick out an organization that appeals to you and join it or go out for an intramural sport. You will find that it's a swell way to meet your classmates and it will go a long way toward developing the well-rounded personality that makes a good engineer.

So, remember, in two or three years you will have the job of making Rose's extra-curricular activities work. Will you be ready?

R.A.L.

For Young Engineers:

THE FACTS OF LIFE

By W. T. Nichols

Editor's note: *Mr. W. T. Nichols, a native of Pittsburg, was a member of the research staff of Mellon Institute and remained there until* 1926 *when he became a research engineer for Columbian Rope Company at Auburn, New York. Now director of the General Engineering Department of the Monsanto Chemical Company, he is a recognized leader in the Chemical Industry.*

When commencement is over, engineering graduates report for duty with a new employer with very little real understanding of what opportunities are open to them, what will be required of them and how they will have to behave in order to succeed in accordance with their ambitions. Too much is left to chance and circumstance. In most cases, a man has incurred obligations and responsibilities of a rather serious sort by the time he wakes up to the facts and is no longer very free to exercise discretion in choosing a path of personal development. Almost all engineering graduates work for a salary in commercial, industrial or government organizations. It is with this group that I shall deal in the remarks which follow and more particularly with the segment that works in industry.

Most of us never are entirely free, all our lives, to make just those choices that might suit us best at the time. We have to compromise all through life and since this is so, it is good to learn how to compromise constructively. The important thing, it seems to me, is to compromise consciously and in the light of the facts rather than blindly, being pushed around by circumstances. In the case of engineering graduates, this is especially important for the fact is that there is infinte variety in the kinds of opportunity open to men trained in the engineering discipline. In our very complex American economy, technical aspects have become so important that men with engineering training have invaded every area of corporate activity and have reached every echelon of corporate management, including the very top.

How should a young man go about the job of succeeding? This brings up, at once, the question — What is success? To different people it means different things. I have pointed out at some length, elsewhere, that it is of paramount importance to know what you want out of life. Your idea of success may eventually mean more prestige than money, more comfort than position. Usually, a young man just embarking on a career thinks of success in terms of progress in his profession, advancement in a business organization, gaining a good reputation and the respect and admiration of his fellows. One of the most articulate engineers of all time was the late William E. Wickenden. Some of his writings have been collected under the title "A Professional Guide for Junior Engineers." These make fascinating reading for men just about to embark on a career. Says Dr. Wickenden, " . . . the young engineer must have as he enters upon his career, and certainly must develop consciously and progressively as he pursues his career, some very specific qualities. Some of these qualities are quite homely, some are quite rigorous. They include: courage and integrity, a strong purpose and determination, a thirst for knowledge, imagination, sound judgment, accuracy of thought, instinct for economy, the habit of thinking back from effect to cause, aptitude for leadership, ingeniousness, and the capacity for hard work." As he discusses these qualities more fully it becomes very apparent that success by any definition is not really a matter of luck, though chance may sometimes be quite influential. Good management of your career is certainly a safer bet.

Engineering is an art and therefore must be learned by practice. A neophyte Bachelor of Science in Engineering is not an engineer, may his grades be ever so high. Actually, comparatively few engineering graduates spend their careers in profesional engineering. Large numbers of graduates start out in assignments where there is little chance to learn the engineering art but where engineering training is useful and necessary. A great many such jobs are in production supervision and sales and there are many fine opportunities for men well adapted to these sorts of activities. For those most interested in the theoretical aspects of engineering, all kinds of splendid research opportunities are available. Where a man has strong leanings toward the application of theory to practice, engineering groups of several kinds offer all manner of chances to learn and practice the art of engineering. For those who feel deeply that they wish to learn the art of engineering, even though they may not expect to make a lifelong career in professional engineering, it is obciously wrong to start out in an assignment such that engineering knowledge quickly slips away and is forgotten.

It is important to realize that no one else is going to do your thinking

(*Continued on Page* 26)

WILL *You* BECOME A GOOD ENGINEER?

By Dr. D. B. Keyes

Editor's Note: *Dr. Donald B. Keyes is the New York representative of A. D. Little, Inc., an industrial and research organization. His chief interest has alwoys been in the guidance of young chemists and chemical engineers, and his teaching and supervisory background make him one of the most informative figures in the Chemical field.*

You young men will be given much sound, practical and concrete advice about how to look for and how to secure a job. I am going to take the calculated risk of telling you bluntly what is on the minds of many of us when we evaluatae you as potential employees. We disguise this interest with a carefully worded sociological and psychological questions, but what we want to know, what we must learn, is: Do you really want to be an engineer?

There are many opportunities today for the young man who sincerely loves his profession and can demonstrate his abilities. There always are. The men I know who graduated during the early thirties in the midst of the depression thought they had a pretty tough time, but 90% of them were located in positions within six months after graduation. Many of them now hold very responsible positions in industry and in the technical world. Their chief characteristic then, as now, was that they really loved their profession.

Today, however, there seems to be generated in the minds of our college graduates, especially our engineers, a philosophy peculiar to the times. Personnel directors interviewing men in our colleges tell me that you are inclined to inquire first of all, not about the character of the job, but about pension plans and fringe benefits.

Even if you have a pension in your old age, it will probably appear inadequate from your viewpoint. A research engineer who recently retired as the executive of a large corporation told me that now, although his retirement allowance is $45,000 a year, he is forced to continue to work for a living. Over the years he has acquired some rather expensive tastes and; because of the tax situation and inflation, he cannot maintain his standard of living on his present pension, even though the size of his pension may look large to most of us.

Financial security must not be your primary objective. A rewarding career is dependent upon this fundamental consideration: Will the type of engineering you have elected offer you the incentive, the curiosity and the urge to work hard and "go places."

It has been my privilege to know quite a few distinguished engineers. Looking back over the years, I know of only one of my acquaintances who seems to have acquired real financial security. The state takes care of him and will do so as long as he lives. He paid a very high price for this security, but in fairness to this individual, I must say that he did not wish it this way.

On the other hand, taking a typical example of one of my friends who has been very successful in the engineering field, I know of no time when he was actually financially secure. After working up as general manager of a company, he decided that the future of this company was not too good; it was in a very specialized field. He then became a college professor.

It was quite obvious to me that, although he was one of the finest professors I had ever had the pleasure of listening to in the engineering field, he would be unhappy if he stayed in that position too long. Evidently, his thoughts were along smilar lines, for during World War I he became the president of a war company. With the aid of a very competent staff of young people, he developed this company to such an extent that it became one of the greatest chemical companies of its day. The financial backers of this company, however, did not appreciate the vision of my friend. When he discovered that he could develop the company no further, he promptly lost interest, resigned, and became a consulting engineer.

It wasn't long before another concern, wishing to develop the chemical end of their business, hired my friend. For many years he gave all that he had to the development of this group. His success was phenomenal, and today this company is one of the truly great chemical companies in the world. He remained active, upon request, long after his retirement age. When he finally retired, he still retained an active interest. Today he is still active and still very happy.

At no time in his career, as far as I know, has he ever sought to work for his own financial security, but has given his all to the development of every organization with which he has been connected. It should be remembered, too, that he liked what he was doing, and when he didn't, he changed to a new job that he did enjoy.

Shortly after World War II, another friend of mine, prominent in war work as an engineer, joined one of the smaller research units of a

(*Continued on Page* 30)

Research and

By Bill Cade, jr., e.e.

Not A Space Ship — Just Part Of Largest Circuit Breaker

Because of its size, the giant three-pole circuit breaker which Westinghouse built for an atomic energy plant in Ohio was disassembled for shipment on railroad flat cars. Two of the three tank units are shown being readied for shipment from the Westinghouse East Pittsburgh plant. This three-pole circuit breaker is the first of 35 which Westinghouse will build for the Ohio atomic energy installation. With an interrupting capacity of 25 million kilovolt-amperes, a single big breaker is capable of controlling all the electric power used by a city the size of Pittsburgh, Pa.

Microscopic "Eye"

General Motors Research Laboratories is pioneering in the industrial use of a new type of microscope that measures "peaks" and "valleys" ranging from two to 100 millionths of an inch.

Known as the interference microscope, it appears promising not only as a research tool but also may become a quality control instrument where microscopic smoothness or roughness is important in industry.

Physicists working with it, say it adds the dimension of depth to the art or practice of examining microscopic surfaces, a dimension ordinary microscopes cannot measure.

"It's like looking at the side of a house straight on and measuring how far the bricks stick out from the mortar," said one physicist to get a profile or cross-sectional view to make your measurements."

The optical interference principle by which the microscope operates is not new. However, industrial application of the microscope to surface finish details of such minuteness is a new development.

GM Research Laboratories has one of the first three instruments built on this continent.

Some years ago the laboratories experimented with the interference microscope technique, using makeshift equipment. Later, at the request of GM Research, an optical company constructed a commercial model, and the first unit was delivered in 1950.

Since then researchers have been expanding its usefulness by trying it on a wide variety of industrial problems.

Glass Block Splits Beam

Briefly, the intereference or split beam principle is described as follows:

A beam of light is directed into a block of glass or "beam splitter." The light is split into two parts, with one part being directed through a lens to a flat reflecting surface.

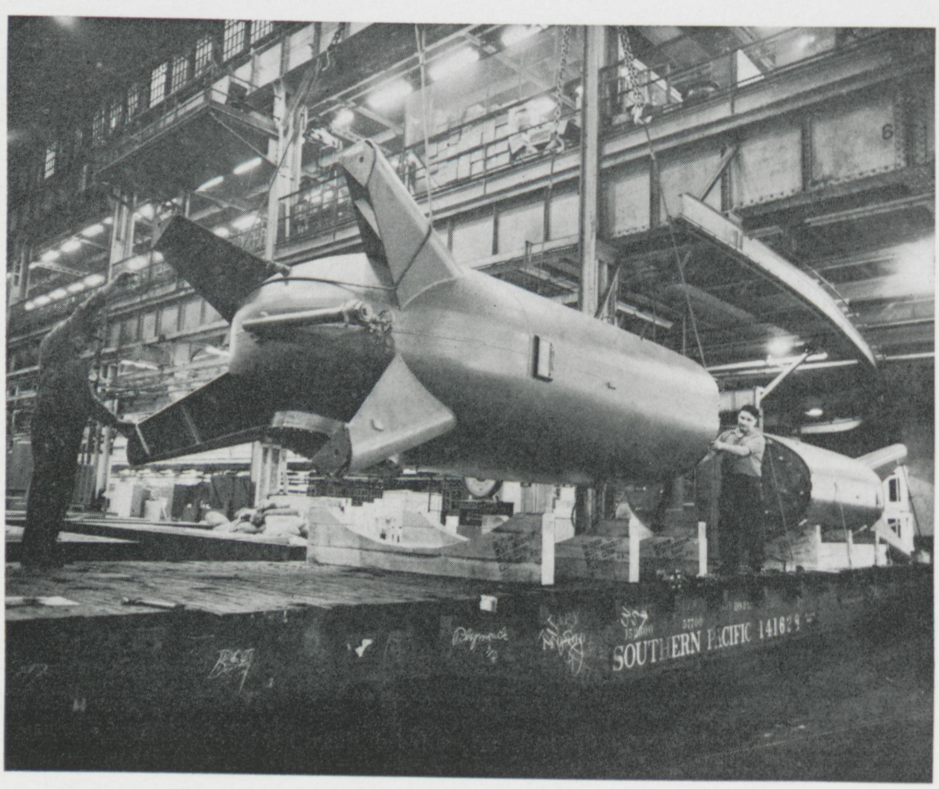
The other part of the beam is directed downward through another lens where it is reflected from the surface of a specimen under examination.

After being reflected from the flat reflecting surface and from the specimen surface, the two beams return through their respective lenses to the beam splitter where they recombine to form an "interference pattern."

The pattern appears as a series of lines — even and parallel if the surface is smooth, or zebra-like, wavy and jagged if the surface is uneven or marred by machining marks or scratches.

The pattern can be viewed through an eyepiece similar to the eyepiece of a conventional microscope.

Thus, depth of scratches or peaks and valleys of an unsmooth surface can be measured by their deviation from the straight-line patterns obtained from smooth surfaces.



Circuit breaker for AEC plant.

Development

Measuring Plating Thickness

Already the microscope has been used to measure plating thickness, to determine leveling abilities of plating materials (i.e., how they smooth a surface by filling in irregularities) and to study effects of weathering on painted surfaces.

It likewise has been used to control precision roughness standards. These are used throughout industry to standardize machined surfaces of bearings, cylinder walls, piston liners, valves and other highly machined, close fitting parts in automotive and aircraft engines.

Another use has been to check corrosion pits and other defects on plated parts and other surfaces such as cylinder bores and bearings.

In this era of precision machinery and highly decorative finishes, many surfaces require the sensitivity of the two-beam interference microscope which can detect surface variations as small as two millionths of an inch.

Mach 3 — in a Tunnel

A construction contract for the major portion of a wind tunnel capable of testing airplane and missile designs at speeds ranging from 400 miles an hour to more than three times the speed of sound has been awarded by North American Aviation, Inc.

The tri-sonic test facility, so called because advanced airplane designs will be tested at speeds slower, equal and faster than that of sound, will be one of the largest constructed by a private company.

Technically, the test facility will be the nation's largest intermittent, blow-down tunnel. Wind speeds will be produced by compressed air rushing from a series of large volume storage spheres at selected intervals. Each test will be less than a minute in duration.

Three internal structures will provide a unique control over the test speeds. An adjustable nozzle, a transonic chamber and a variable diffuser will be placed in a series in the throat of the tunnel instead of separated as in other tunnels to regulate air speeds at sub-sonic, transonic and supersonic levels. Adjustments to each structure in the series to change wind velocity will be made in a fraction of the time necessary for adjustments in other tunnels.

Relatively large, the tunnel's test chamber will handle an airplane or missile model with a wing span of about four feet. The chamber will be 17 feet long and seven feet square.

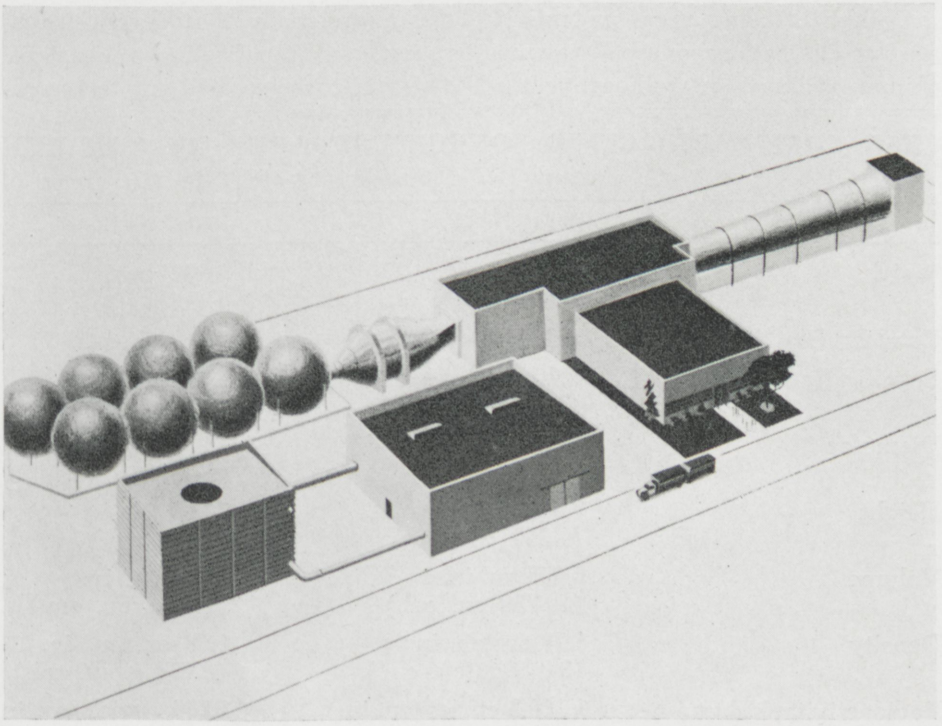
Eastman Kodak Unveils Heat-Sensing Cell With 10,000-Time Sensitivity Boost

Little slips of glass coated with lead sulfide that can give 10,000 times as much sensitivity to certain infrared rays as previous laboratory instruments have now been put on sale to science and industry by the Eastman Kodak Company.

Known as Kodak Ektron Detectors, the new photoconductive cells were first unveiled at the convention of the American Society for Testing Materials. The company believes that the extreme infrared sensitivity of the cells, coupled with their simplicity and adaptability to manufacture in any size or shape, opens wide new possibilities to engineers in developing new devices based on the ability to detect warm objects without physical contact and over long distances.

Announcement of the availability of the Ektron Detectors culminates a decade of research by a team of Kodak scientists. Though the cell reaches its peak of sensitivity in the invisible heat rays of the near-infra-

(*Concluded from Page* 34)



Tri-sonic Wind Tunnel.

From A.E.C.

$^{55}Cs^{137}$

Development of a new isotope material that may become an important factor in cancer research was announced recently. For the first time in scientific history, large quantities of the radioisotope cesium-137 have been separated and compressed into pellets. This achievement was the result of 2½ years in research and development at this atomic center.

The cesium-137, which is the most important long-lived gamma-ray emitting isotope found in spent reactor fuel, was chemically separated from fission products available at the Laboratory. The first cesium pellets will be used as a radiation source in a new teletherapy unit being prepared for cancer research in the Medical Division of the Oak Ridge Institute of Nuclear Studies. "Large quantities" of high purity cesium-137 means just these two pellets, each about the diameter of a half-dollar — a half inch thick and weighing a little more than an ounce. The two pellets contained 1540 curies of radioactivity, equivalent in radiation energy to more than one pound of radium, which at current rates would cost more than $1,000,000.

Cesium-137 has great potentialities for applications where X-ray machines, radium, or radioactive cobalt-60 are now commonly used. Although performing essentially the same functions, it offers several advantages over these radiation sources.

One advantage lies in its relatively long-lived intensity. Cesium-137 has a half life of 37 years, over seven times that of cobalt-60 though not nearly so long as radium's almost 1600 years. Another feature is the favorable range of its energy. Its gamma radiation energy is 0.66 million electron volts (Mev), as compared with 1.2 Mev for cobalt-60. This lower energy is sufficient for successful deep therapy, yet it requires less shielding than a cobalt source. In radiographic work, too, this lesser energy can frequently provide better contrast than the more energetic cobalt radiation. The energy of the combined two pellets just prepared at Oak Ridge National Laboratory is comparable to the peak energy given out by much more expensive million-volt X-ray machines.

Most of the cesium program for the first two years was devoted to research on the problem. It was not until November, 1953, that the Oak Ridge National Laboratory group was ready to undertake separation and purification operations. The work was carried out in a comparatively small pilot plant. The primary separation was accomplished during the four month period from November, 1953, to February, 1954, and final fabrication of the source was completed in March of this year.

In preparing the pellets, dry powdered cesium chloride was placed in a die in a hydraulic press and subjected to a pressure of 20,000 pounds per square inch. The pressing operation was repeated, producing two pellets, each slightly over ½ inch in height, 1¼ inches in diameter, and averaging a little over 1 ounce each in weight.

After pressing, the pellets were placed in the stainless steel jacket which was closed by silver soldering. This jacket, with its potent contents, was in turn sealed into another outer stainless steel jacket in order to be doubly sure of a leakproof container.

The new source will be held for observation at the Laboratory until July, at which time it will be installed in the Oak Ridge Institute of Nuclear Studies teletherapy unit, and the Institute will officially assume title to it. It is expected that ORINS will then spend some time evaluating the cesium-137 source before it is used in cancer research. Ω

CESIUM-137 RADIOACTIVE SOURCE PREPARED BY OAK RIDGE NATIONAL LABORATORY
Cesium-137 Chloride ($Cs^{137}Cl$) in the form of two pellets

	Pellet No. 1	Pellet No. 2	Combined Pellets
Weight	1.166 oz. (33.07 g.)	0.9827 oz. (27.86 g.)	2.149 oz. (60.93 g.)
Total Radioactivity	760 curies	780 curies	1540 curies
Specific Radioactivity	651.8 curies/oz. (22.98 curies/g.)	793.7 curies/oz. (27.997 curies/g.)	716.6 curies/oz. (25.27 curies/g.)
Diameter	1.253 in. (3.1826 cm.)	1.253 in. (3.1826 cm.)	1.253 in. (3.1826 cm.)
Height	0.531 in. (1.350 cm.)	0.504 in. (1.280 cm.)	1.035 in. (2.63 cm.)
Volume	0.655 cu. in. (10.739 cu. cm.)	0.621 cu. in. (10.182 cu. cm.)	1.276 cu. in. (20.922 cu. cm.)
Density	1.78 oz./cu. in. (3.079 g./cu. cm.)	1.58 oz./cu. in. (2.736 g/cu. cm.)	1.684 oz./cu. in. (2.912 g./cu. cm.)
Radioactivity/volume	1,160.3 curies/cu. in. (70.77 curies/cu. cm.)	1,256 curies/cu. in. (76.61 curies/cu. cm.)	1,206.9 curies/cu. in. (73.61 curies/cu. cm.)

QUARTZ CRYSTALS

How a 1¼ hour "gem-cutting" operation became an 8-minute mechanized job

PROBLEM: Preparing quartz crystals for use as electronic frequency controls calls for the highest degree of precision. So much so, in fact, that prior to World War II skilled gem-cutters were employed to do the job.

But during the war, there were not enough gem-cutters to keep up with the demand for crystals in radar, military communications and other applications.

Western Electric tackled the job of building into machines the skill and precision that had previously called for the most highly skilled operators.

SOLUTION: Here is how quartz crystals are made now—by semi-skilled labor in a fraction of the time formerly required:

A quartz stone is sliced into wafers on a reciprocating diamond-edged saw, after determination of optical and electrical axes by means of an oil bath and an X-ray machine. Hairline accuracy is assured by an orienting fixture.

The wafers are cut into rectangles on machines equipped with diamond saws. The human element is practically eliminated by means of adjustable stops and other semi-automatic features.

The quartz rectangles are lapped automatically to a thickness tolerance of plus or minus .0001". A timer prevents overlapping. Finally, edges are ground to specific length and width dimensions on machines with fully automatic microfeed systems.

Most of these machines were either completely or largely designed and developed by Western Electric engineers.

RESULTS: With skill built into the machines —with costly hand operations eliminated— this Western Electric mechanization program raised production of quartz crystals from a few thousand a year to nearly a million a month during the war years. This is just one of the many unusual jobs undertaken and solved by Western Electric engineers.

Quartz stones are cut into wafers on this diamond-edged saw, with orientation to optical axis controlled by fixture. This is just one of several types of machines designed and developed by Western Electric engineers to mechanize quartz cutting.

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

Manufacturing plants in Chicago, Ill.; Kearny, N. J.; Baltimore, Md.; Indianapolis, Ind.; Allentown and Laureldale, Pa.; Burlington, Greensboro and Winston-Salem, N. C.; Buffalo, N. Y.; Haverhill and Lawrence, Mass.; Lincoln, Neb.; St. Paul and Duluth, Minn. Distributing Centers in 29 cities and Installation headquarters in 15 cities. Company headquarters, 195 Broadway, New York City.

Library Notes

By Carson W. Bennett and Nina J. Mahaffey

We read to think, to know, to grow mentally, to know how to talk, write, and present our own thought clearly. Through reading, we learn to use the right tools—Words.

Autumn is the time of great Sporting events, particularly the World Series and great football contests too numerous to mention here. All of this interest in sports prompted the library staff to search our collection for sports books and periodicals.

We have two excellent sports periodicals:

Athletic Journal—The old standby and extremely popular journal.

Sports Illustrated—a brand new one which is done in the grand manner of its close relatives, *Time, Life,* and *Fortune.*

For books in the field of sports we recommend the following:

Menke, Frank G. *Encyclopedia of Sports.*

The most comprehensive thing in the field, covering everything in alphabetical order from Angling to Yachting. An excellent article with many satistics on football is included.

Cozens, Frederick W. *Sports in American Life.*

A very fascinating and authoritative history of sports.

Intercollegiate football.

A complete pictorial and statistical review from 1869 to 1934.

Stagg, Amos Alonzo. *Touchdown!*

The story of one of footballs great immortals, the one and only Amos Alonzo Stagg.

SO THIS IS COLLEGE

We are happy each year to welcome a new group of students to Rose Polytechnic Institute. This year we are especially happy to welcome such a bumper crop. May your stay at Rose be enlightening, satisfying and happy.

When new students enter college they find that very suddenly they are called upon to make many personal and social adjustments. And what happens? They get problems. Problems concerning making and keeping new friends, conquering loneliness and inferiority feelings, balancing work and play, planning ahead for a career after college and dozens of other problems start showing up.

Now we don't have *all* the answers by any means. However, we can promise to help combat some of them. The following list of books should prove helpful to many people; freshmen, sophomore, junior and senior engineer students included. So if you have a problem — browse here:

So This Is College, by Paul H. Landis.

Actually pointed toward the problems of college people, this book is a very helpful, down-to-earth guide. Based on the term papers of many students who were asked to analyze the development of their personalities. Very important if you think your problem is the first of its kind.

How to Develop Your Thinking Ability, by Kenneth S. Keyes.

Explains an effective method to develop clear thinking. Clever drawings by Ted Key illustrate each point.

How To Attract Good Luck, by A. H. Z. Carr.

Here is the first realistic and concrete explanation of the way in which luck operates in our daily lives.

How to Make Sense, by Rudolph Flesch.

An inspirational book dealing with communication. It shows how improvement in speaking, reading and writing can be a means to a better way of life. Includes a scientific technique for training in rapid reading and self-training exercises for better speaking and writing.

Think for Yourself, by Robert P. Crawford.

The purpose is to awaken the mind and thereby to help you secure ideas and solve your own problems well and easily. The discovery of ideas and the solution of problems should be made the most interesting and the most profitable game in the world.

The Technique of Getting Things Done, by Donald A. Laird.

The biggest handicap to success is not lack of brains, not lack of character or willingness. It is an inability to get things done. Some do not know how to plan their work, others are unable to make decisions quickly, while still others cannot apply themselves to tasks they dislike. Here's the answer.

The Techniques of Creative Thinking, by Robert P. Crawford.

How to have ideas and how to develop them.

The Mind Alive, by Harry and Bonaro Overstreet.

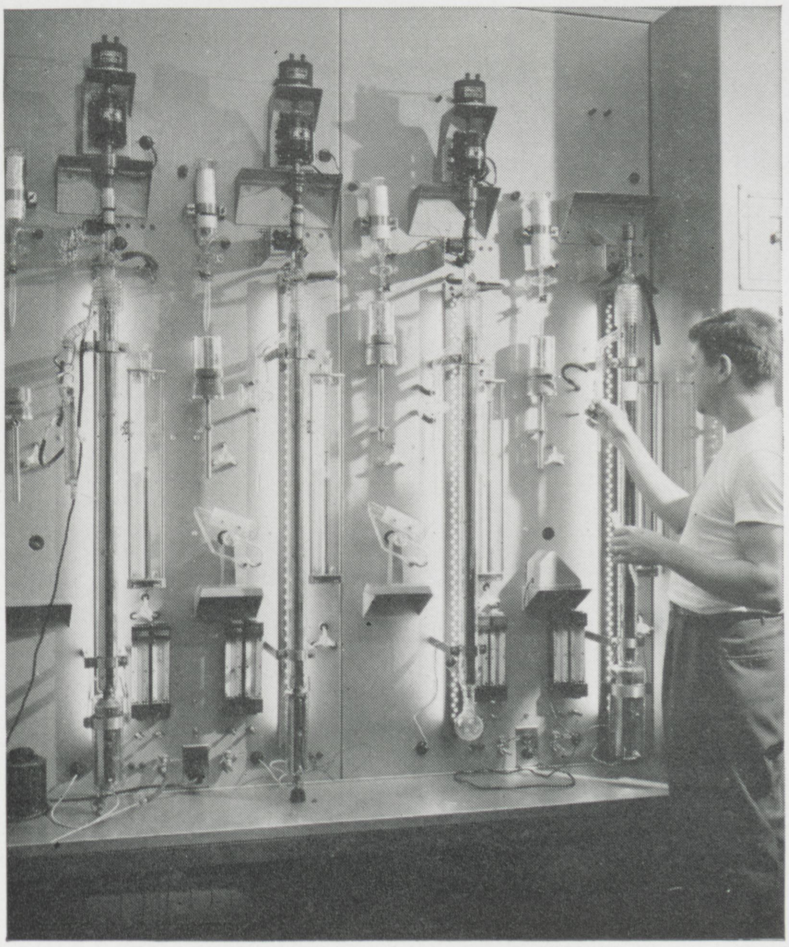
Describes the kind of obstacles that interfere with the effective exercise of our abilities. The authors show that when these obstacles are recognized for what they are, they lose their power to cause anxiety and tension, and no longer block the healthy expression of our personalities. Step by step, we learn to accept ourselves as we are, turn our minds outward, handle life better, and be more alive in our responses to it.

This I Believe, edited by Edward R. Murrow.

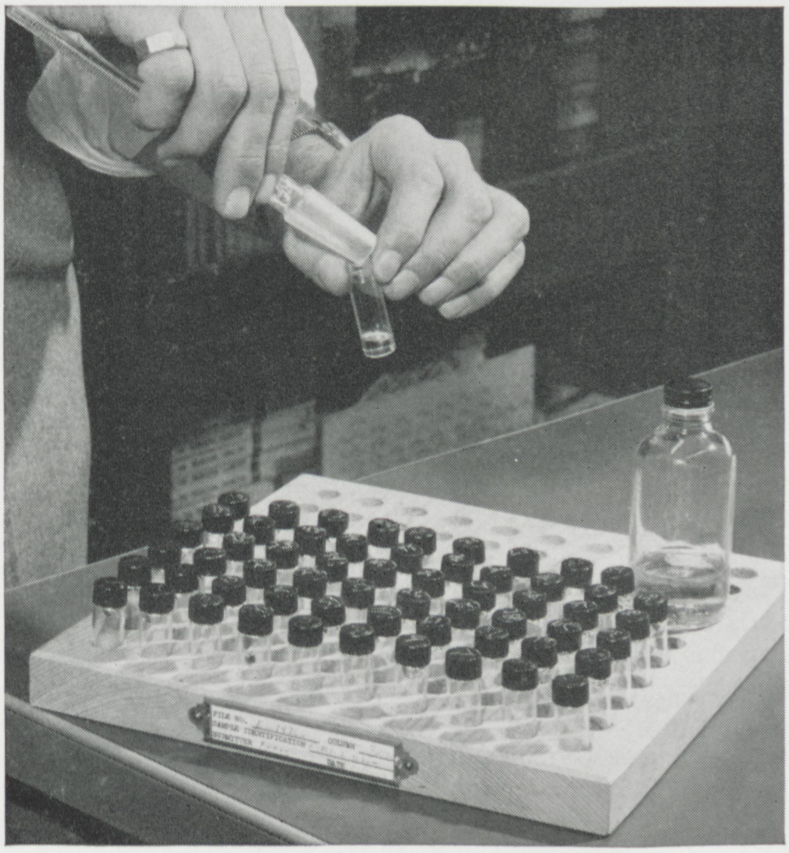
"The living philosophies of one hundred thoughtful men and women in all walks of life." (subtitle)

How to Enjoy Yourself, by Albert A. Ostrow.

A practical, factual book on ways for enriching your life and enjoying more fully your leisure. Ω



A laboratory assistant (above) takes a fraction from one of the new miniature stills at Standard Oil's Whiting laboratories. The small charge in the large bottle (below) can be separated into 60 fractions in these exact stills.



NEW MINIATURE STILLS

Valuable Laboratory Aids

Some stills in oil refineries are gigantic devices which process 30,000 barrels of petroleum a day. Others are so small—and so exact—that they may take more than a week to distill five ounces of liquid.

Scientists at Standard Oil's Whiting laboratories now are working with eight new miniature stills so precise they are considered the finest of their type in the world. These stills, installed last year, are used to study liquids produced during research on such things as aviation gasoline, synthetic lubricants and detergents, plastics and plasticizers, and petrochemicals.

Laboratory men often work with only an ounce of liquid which may be made up of hundreds of different chemical compounds. Technicians usually wind up with individual "fractions" of about 1/50 of an ounce to be examined with mass and infra-red spectrometers, chromatography and other aids.

Another new research still at Standard Oil's Whiting laboratories has a packed column one inch in diameter and 16 feet high. It is probably the most efficient packed column ever built.

Such precise up-to-the-minute laboratory equipment helps Standard Oil scientists in their never-ending search for new and better products. And it offers young technical men the assurance that Standard Oil is a sound, progressive place to build a scientific career.

Standard Oil Company

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STANDARD

Alumni News

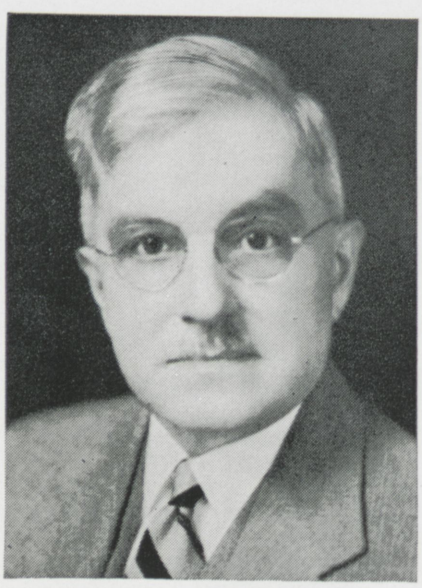
By Birt Kellam, soph., e.e.

'01 Schwartz, Dr. Harry A., E.E., a former member of the faculty, died July 25th at his home in Cleveland, Ohio.

Well known in Terre Haute through his active participation in alumni activities and close association with the college after his graduation, Dr. Schwartz was at one time a member of the Board of Managers of Rose and also served as president of the Alumni Association for one year.

Dr. Schwartz had been associated with the National Malleable and Steel Castings Company since his departure from the Rose campus in 1902. He taught drawing for one year after graduation. He served with the firm in Indianapolis for a number of years before being transferred to Cleveland as manager of research. Hailed as one of the nation's leading malleable iron metallurgists, he received an honorary degree of doctor of science from Rose in 1933 and an honorary degree of doctor of engineering from Case School of Applied Science in Cleveland in 1936 where for many years he was a lecturer on special subjects.

For his contributions to the foundry industry he was awarded a gold medal by the American Foundrymen's Association and was honored with another gold medal by the Institute of British Foundrymen, being the only American ever to receive it.



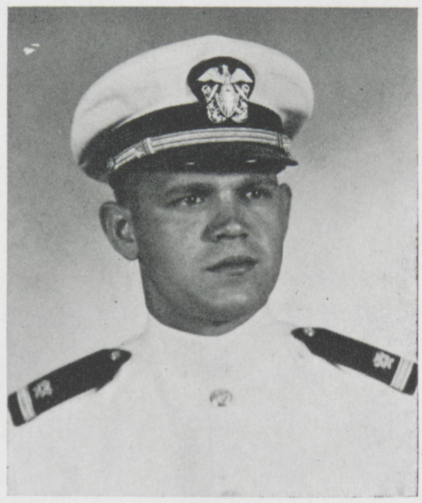
Dr. Harry A. Schwartz

'11 Christopher, Dr. George T., E.E., former president and general manager of the Packard Motor Company, died unexpectedly of a heart attack at his farm near Tipp City, Ohio, June 7, 1954. Dr. Christopher had served for two years as Alumni Representative on the Board of Managers of Rose. In addition to his B. S. degree, he held the honorary degree of doctor of engineering awarded in 1949. He was the alumni speaker in 1936.

Dr. George T. Christopher

Born in Cloverdale, Indiana, he became one of the nation's top automobile executives in the '30's. Dr. Christopher was associated with the General Motors Corporation for 15 years and from 1919 to 1927 he headed the Delco Products division in Dayton, Ohio.

In 1927, he joined Oldsmobile and in the fall of 1929 became vice president of manufacturing for Pontiac. He went to Buick in the same capacity in 1932, but two years later he decided to retire and devote full time to his interest in farming and bought a 435-acre tract of land near Tipp City.



Leo E. Little

However, just 70 days later he returned to the automobile industry as vice president in charge of manufacturing for Packard, and a short time later became the firm's top executive. Since his second retirement in 1948, Dr. Christopher had been active on his farm.

'52 Little, Leo E., E.E., has just completed the Navy's eight week indoctrination course for Reserve Staff Corps Ensigns. The eight week course includes subjects in Naval traditions and customs, and Naval Organizational methods, designed to acquaint the candidates with the duties and responsibilities of a Naval Officer.

NOTE: *The Educational Director of A. N. Marquis Company, publisher of "Who's Who in America," has informed the Institute that Rose stands second only to Wabash College among all colleges and universities in the state of Indiana in the proportionate number of graduates listed in "Who's Who." And by the way, this is not "Who's Who in Engineering."*

In the nation Rose stands thirty-sixth among all colleges ond universities on the same basis of proportionate representation and second only to M. I. T. among engineering colleges. Ω

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IN INDUSTRY—Food is prepared in super-sanitary stainless steel equipment. Streamlined trains and buses are made of this wonder metal. Vital parts of jet planes that must withstand both blazing heat and sub-zero cold are made of tough, enduring stainless steel.

SERVING STEEL... AND YOU—The people of Union Carbide produce alloys of chromium for America's steelmakers. This is another of the many ways in which UCC transforms the elements of nature for the benefit of everyone.

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Fraternity Notes

Theta XI

Theta Xi opened the 1954 fall semester in good fashion. Sixteen men are now living at the house. We were happy to welcome back brothers Boesenberg, Wilcox, Lai, Scharpenberg, Pejril, Marshall, Mrava, Merrelli, Masuoka, Solmundson, Waggener, Moore, Granlund, and Schramm. Completeing the sixteen man roster are recent pledges Fred Sauerteig and Ray Fischer. The only casualty of the last school year was Fred Von Allmen. We wish him the best of luck.

Already plans are being executed to improve the house. Included in these are the painting of the exterior trim and the obtaining of new study desks and bureaus.

We are all hoping for the rapid recovery of brother Al Merrelli who suffered a dislocated elbow in the opening football game.

A modern innovation that took the house by storm at the beginning of the school year was brother Marshall's home-made hi fidelity phonograph. Lou, a licensed electrician, completed his lay-out over the summer.

We also welcomed back into the fold brother Bill Elsey, who returned from the service. Bill plans to graduate in January.

Congratulations are in order for brothers Solmundson, Merrelli and Granlund, who became pinned during the summer.

Gene Mrava

Lambda Chi Alpha

During the week preceding school the house was given a general face lifting, a coat of paint and other improvements.

On Saturday, September 25, a party was held for the student nurses from St. Anthony's and a good time was had by all.

Lambda Chi Alpha this year is well represented in the many organizations on the campus. Fred Goetch is president of the Sophomore class. Terry Webster was chosen to serve as president of the glee club. On the football team are Bob Young, Jim Calabro, 'Harv' Greene, Terrell Vanover, and Bob Payne.

Congratulations are in order for George Ross who is now engaged to Miss Mary Alamason; for Wayne Mason, who placed a ring on Miss Evelyn Reagin, of East Chicago, Ind. and for Terry Webster, who pinned Miss Rose Williams of Oden, Ind. One of the members, Larry Samuels, took the big step and made the former Miss Nancy Meyers of Louisville, Ky. Mrs. Larry Samuels. Best of luck Nancy and Larry.

J. R. Fromholz

Sigma Nu

Beta Upsilon Chapter of Sigma Nu began its sixtieth year this fall as an active fraternity on the Rose Campus.

The Chapter at 831 S. Center houses twenty-four actives this year with an additional twelve actives eating their meals at the house.

The Chapter welcomes back to Rose this year Kenny Cross, who is continuing his study in the field of Electrical Engineering. Kenny served some two years in the Radio Repair branch of the Army Signal Corp.

The long-needed improvements of insulating and lighting the sleeping quarters at the house have been undertaken by Gil Kovener and committee. Gil plans to insulate the walls and ceiling with sheet-rock and to clothe the floors with asphalt tile. A new system of lighting will also be installed.

Sigma Nu's football additives to Phil Brown's line include; Ray Fischer, Jim Tatooles, Art Sutton, Bob Woldstad, Carl Cunningham, and Owen March, who is also co-captain of the team.

Sigma Nu has made arrangements for Mrs. DeGraff to live at the house six days out of the week. This arrangement has proven to be quite satisfactory in view of the dating rules applied to the actives and their dates. Also through this plan, the ancient dread of foul weather stopping "Mom" from getting her "seven-o'clock-breakfast" has been eliminated.

John Rhodehamel

Alpha Tau Omega

The Taus welcomed in the new school year in the traditional fashion, a hayride with hot dogs and cider. The event was a great success in spite of, or possibly because of, the fact that in the crowded darkness no one was quite sure whether they had their own girl or someone else's. There was one near disaster when "Rock" Furlan misplaced his date, but she was picked up on the way back.

During the summer several of the brothers, Kermit Morris, Ron Meridith, Bob Travis, Lafe Stewart, and Carter Smith took a trip down to Atlanta, Georgia to the biennial Alpha Tau Omega National Congress. Afterwards Lafe and Carter finished their vacation in Florida. John Gregory, Joe Billman, Bill Supp, Dick Bosshardt, and Don Powers took their vacation at Fort Leonard Wood, Missouri. They were especially touched by the beautiful climate and warm friendship which they met at the Fort.

Plans are progressing for a big Homecoming celebration with special anticipation for a large turnout of alumni. Bob Travis and Ron Meridith are supervising the Homecoming decorations, while Walt McIndoo and Frank Eppert are in charge of the other preparations. Bill Supp is chairman of the Homecoming dance.

Art Masters

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- Design of component parts such as coils, loudspeakers, capacitors.
- Development and design of new recording and producing methods.
- Design of receiving, power, cathode ray, gas and photo tubes.

Write today to College Relations Div., RCA Victor, Camden, N. J. Also many opportunities for Mechanical and Chemical Engineers and Physicists.

Locker Rumors

By George Rezek, jr. m.e., and Don Carrell, soph. m.e.

Autumn leaves had not yet begun to fill the air when Coach Phil Brown strode out to the football field. The country was losing its taste for baseball, and All-American choices were liberally splashed among the nation's sports pages, attempting to draw attention away from the run-away Indians. Everyone was joining the pigskin parade; with a quantity of returning lettermen, a single wing, T with variations, and a little luck, Rose was ready to join too.

Prospects didn't look too bad, either, even at that early date. Thirteen lettermen, nine of whom had seen regular service, were back; there was a talented batch of freshmen available, plus quite a few other fellows who knew their way around a gridiron. Spearheading the '54 eleven are co-captains Owen March ond Larry Samuels, last year's leading ground gainer at fullback. Among the other veterans are Jim Calabro, Ray Fischer, Al Merrelli, Gene Stoker, Doyne Granlund, Jim Tatooles, Harv Greene, Bob Young, Jay Stevens, Bill Payne, and Terry and Larry Samuels, last year's lead-in ground gainer. Among the other veterans are Jim Calabro, Ray Fischer, Al Merrelli, Gene Stoker, Doyne Granlund, Jim Tatooles, Harv Greene, Bob Young, Jay Stevens, Bill Payne, and Terry Vanover. Missing from the ranks was Harry Stutts, Prairie Conference scoring leader, who decided to help Uncle Sam fly his jets. With this aggregation the Engineers are seeking to annex their second Prairie Conference championship.

Among the "musts" on this season's sports calendar is a win against Illinois College. Such things are always conducive to a nice, happy homecoming, and it looks good in the conference standings too. Last year's win gave Rose a lifetime record of 1-1 with the Blueboys, so this contest should be a tiebreaker. Illinois College boasts of 17 returning lettermen, some of whom enjoy winning 100 and 220 yard dashes during the track season. In all, it amounts to a real "strength of materials" test for the Engineers.

Colts vs. Comets, Brownie Fires to ——— ?

Principia will close the season for the Techmen and once again retire Rosie to her place of prominence in the fieldhouse. The conference championship could well be at stake in this encounter. Since the days of Eddie McGovern, Principia has been a worthy opponent four times in eight contests, so the Engineers will again be seeking to gain an advantage in the football fortunes of the two schools.

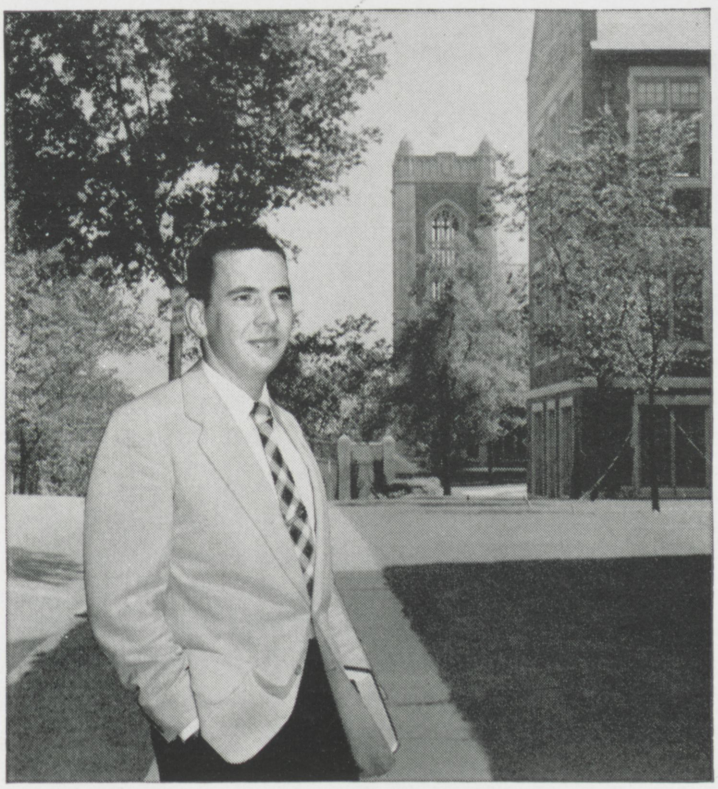
Against Taylor in the season's opener, the Engineers looked good, but a few lapses meant the ball game.

Late in the first quarter, Taylor found the way to paydirt to lead 6-0. With 5 minutes left in the first half, Bob Young took a punt on his own 15 and pranced down the far sideline to knot the score. Bill Payne then sent Rosie around the field by adding the extra point. Midway in the fourth quarter, Taylor clicked on a 47 yard pass to finish up the day's scoring 12-7.

As a result of the Taylor game, Al Merrelli was lost for the season with a dislocated elbow. Terry Vanover may not see action again this year either. Both were scheduled to carry a large part of the backfield chores.

If you'll permit a departure from the hot stove, we've this much to say about Rose and its football fortunes. Real pep and cheering has never hurt a football team; in some cases it provides the confidence and drive necessary to make a team click. Have

(*Continued on Page* 28)



Donald W. Sundstrom received his B.S. degree in Chemical Engineering from Worcester Polytechnic Institute in 1953. He's currently studying for an M.S. degree and expects to receive it next year. Like other engineering students, he's asking a lot of searching questions before deciding on a permanent employer.

Don Sundstrom asks:

What are my chances for advancement in a big firm like Du Pont?

Gerald J. Risser, B.S. Chem. Eng., Univ. of Wisconsin (1937), is now assistant manager of the Engineering Service Division in Du Pont's Engineering Department, Wilmington, Delaware.

Jerry Risser answers:

I THINK I know exactly what's behind that question, Don, because the same thing crossed my mind when I first graduated and looked around for a job. That was about seventeen years ago, when the Du Pont Company was much smaller than it is today. And there's a large factor in the answer, Don, right there! The advancement and growth of any employee depends to a considerable degree on the advancement and growth of his employer. Promotion possibilities are bound to be good in an expanding organization like Du Pont.

Right now, for example, construction is in progress or planned for three new plants. That means many new opportunities for promotion for young engineers. And, in my experience, I have found it is a fundamental principle of Du Pont to promote from within the organization—on merit.

My own field, development work, is a natural for a young graduate, because it's one of the fundamental branches of engineering at Du Pont. There are complete new plants to design, novel equipment problems to work on, new processes to pioneer—all sorts of interesting work for a man who can meet a challenge. Many of the problems will involve cost studies—some will require evaluation in a pilot plant—but, in every case, they'll provide the satisfactions which come from working with people you like and respect.

All in all, Don, your chances of advancement on merit are mighty good at Du Pont!

Want to know more about working with Du Pont? Send for a free copy of "Chemical Engineers at Du Pont," a booklet that tells you about pioneering work being done in chemical engineering—in research, process development, production and sales. There's a step-by-step outline of the leadership opportunities that confront a young Du Pont engineer—how he can advance—and how he can obtain help from experienced members of the team. Write to E. I. du Pont de Nemours & Co. (Inc.), 2521 Nemours Building, Wilmington, Delaware.

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

WATCH "CAVALCADE OF AMERICA" ON TELEVISION

The O'Calorie Caper

From Brooklyn Poly A.I. Ch.E. News

My name's Lecular. I'm a cop. My first name is Moe. Yeah! Moe Lecular. I'm with the Hicapa City police force. My boss is Ray Nold. He's a vari-able cop. He has the shiniest badge of them all. Everyone knows Ray Nold's number.

I just finished the O'Calorie Caper. This was a tough case. I could see after my first try that my assumptions were wrong, so I revised them and ran a second try. The whole case revolved around the death of O'Calorie, a Big Businessman. His company made and sold Bigs.

After an anonymous phone call I had found O'Calorie's body in his orifice. When he fell he had knocked a lamp into a fish bowl. He wasn't dead long. I could tell by the wet-bulb's temperature. I began to look for clues. I wondered if distill were any left. I could see this case-hardening.

After another anonymous phone call (pay attention, helical again), I went to the O'Metric Bar to look for that notorious bum, Sam Metrical. I found him sitting with his girl, Miss Cible. The juke box was playing Bessemer Mucho. When Sam saw me in my uniform, he got up to solute me. I said: "Don't be a fuel, Sam, sit down." Sam said: "Water you want, Copper?" "Don't get oxided", I retorted, "come with me to the station for a 15-minute quiz."

I knew we couldn't hold him long, so I booked him on a violation of Dalton's Law. We began to question him. I could see that he was a two-phased character, but right now he was minus one degree of freedom. I told him: "Come on, Sam, confess. Did you kill O'Calorie?"

"Don't be anode dope, Copper. Ammonia poor salesman."

"Look, Sam, the sooner you confess, the sooner you can see your girl, Miss Cible. You lacquer, don't you?"

"Sure, but I toloul I know."

"Sam, the sooner you confess, the quicker my partner and I can coefficient. We have hired the boat, have all the tie lines we need, and want to catch Trouton the lake. Now, lattice go, huh?"

"Okay, Copper. My lawyer is Sinus Oidal. As soon you call-oidal, I'll confess."

As soon as his lawyer came, Sam began to torque. "It all began", said Sam, "tuyeres ago when I met Miss Cible. I wanted to buy her a lot of joules, but I had no monel. So, I decided to do some big business, which led me to make a bug business deal with O'Calorie's Big Business. We were to sign a contract, but vena contracta came, O'Calorie refused to sine it. This Rayleigh got me mad."

"Well, continue Sam. Weir waiting."

"Okay, I gas I can finish."

"Make it a perfect gas, Sam, or you'll throw off our calculations. You know what amine?"

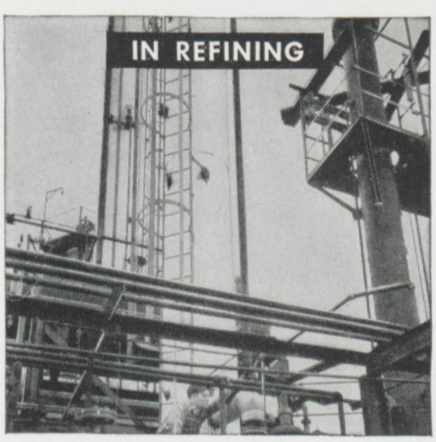
"Yeah, that's okay, Baume. Well, after I left O'Calorie's orifice, I began to make plans. I got into my new powder blue Catalyst Convertible and drove out to Nick's Isobar. I hesitated to enter because Ionic too much money, but I then did. Inside I met my pal, Packy Coumn. From him I bought some poison and then I centipoise to O'Calorie in a box of Silica Jelly beans. Then I had a cup of hot Delta Tea and went home."

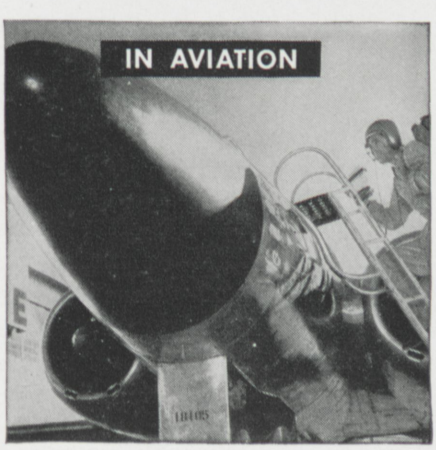
"You know you shunt have done that, Sam."

"Yeah, I should've known that I Carnot outgas you. I planned to make my girl, Miss Cible, over the border to Rio Stat, but you caught me."

After the trial and Sam's convection, I received another phone call. It was from the realty agent for Prism Prison. It was he who had helped me solve this case for he had a cell available for sharing with its present tenant, one Al Lectrolyte.

Incidentally, Miss Cible is now married to Sol Ution. So, that's sulfur this case. Have to call my boss now. Hmm, wonder what Ray Nold's number is? Ω





HONEYWELL OFFERS CHALLENGES UNLIMITED

THE challenges and problems for the engineer in the automatic control field are unique in their variety and in the insight provided into all of the industries of today's modern world.

The development and manufacture of tiny transistors for electronic control . . . the design and construction of giant control valves for oil refineries . . . the challenge of finding fish with underwater sonar . . . of providing automatic flight for supersonic jets . . . temperature controls for today's modern home . . . for atomic piles . . .

These are a few of the fields in which Honeywell's several divisions are engaged, providing automatic controls for industry and the home.

These controls are made possible by the creative imagination of highly trained engineers working with the very latest research and test facilities.

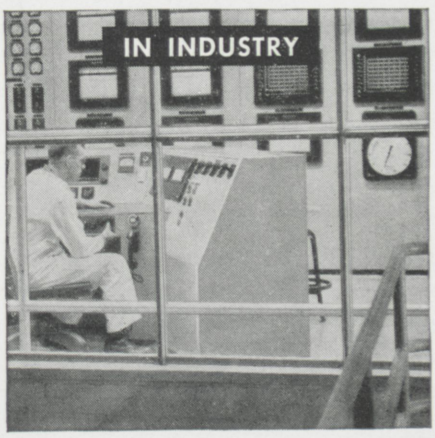
With nine separate divisions located throughout the United States and with factories in Canada, England and Europe, Honeywell offers unlimited opportunities in a variety of challenging fields. Based on diversification and balance between normal industry and defense activities, Honeywell will continue to grow and expand because automatic control is so important to the world's progress. And automatic control is Honeywell's business.

That is why we are always looking for men with ideas and imagination and the ambition to grow with us. In addition to full time engineering and research employment we offer a Cooperative Work Study program, a Summer Student Work Study program and Graduate Fellowships. If you are interested in a career in a vital, varied and diversified industry, send the coupon for more information.

MINNEAPOLIS **Honeywell**

First in Controls

Divisions: Appliance, Aeronautical, Commercial, Heating Controls, Industrial, Marine, Micro Switch, Ordnance, Valve.



MINNEAPOLIS-HONEYWELL
REGULATOR CO.
Personnel Dept., Minneapolis 8, Minn.

Gentlemen: Please send me your booklet, "Emphasis on Research", which tells more about engineering opportunities at Honeywell.

Name _____

Address _____

City _____

Zone _____ *State* _____

Facts of Life

(*Continued from Page* 10)

for you. Your new employer knows no more about you than you know about him. He has probably classified you on the basis of a relatively brief interview. If he needs a man for production supervision or sales or research or engineering and you seem to fit, you may get the job, but such an assignment may not lead you in the direction you want to go. While an employer is naturally anxious to have you in a job you like and where you will be happy, he cannot read your mind. The primary responsibility for your progress will always be yours. If you wind up as a routine draftsman or a clerk when you could have handled much greater responsibilities, the blame cannot be placed on your employers. Even in big companies that have elaborate personnel organizations and plentiful training programs, the burden is on the man himself to find his kind of success and right path to his chosen goal.

Job satisfaction is important. No one can be truly happy or even fairly effective unless his job gives real satisfaction. There are two primary approaches. One is to find a worthwhile course of development that fits your characteristics. The other is to alter your characteristics to fit some worthwhile course of development. In most cases, some of each is required. Early training and family environment are influential factors in determining personal characteristics. A boy brought up under certain circumstances may largely lack the ability to maintain warm personal relations with other people. Such a person might be most comfortable, if left to his own devices, if he works at a job in which he has little or no contact with others and in which he can succeed without the cooperation of others. It is important to realize that, increasingly, technical work involves team work. "Lone-wolf" assignments are rare. This means that, increasingly, engineers must develop skill in human relations.

There are people who are happiest and most satisfied when they have technical responsibility and authority, rather than supervisory responsibility and authority. Such a person might by choice or by accident devote his career to a relatively narrow field of engineering activity. For example, a man might become a *top authority* on a subject such as steam boilers of steam turbines or switch gear or underground water resources or fractional distillation or mine safety or soil structure or corrosion. It is not difficult to imagine the intense satisfaction and sense of accomplishment which a certain type of mind would derive from such high attainment. Great technical authority can be wielded by these technical experts and great technical responsibility assumed. Many men enjoy such a life almost without regard to the income aspects or organization position. As our economy increases in technical complexity, the more progressive companies are realizing how very valuable great technical expertness is and are much more inclined than they once were to reward it in terms of both money and organization stature. Thus, a young engineering graduate might well consider the advantages of this path of development. It is not easy to get started on such a career. Few men just out of school have any strong devotion to a relatively narrow field of engineering. They are much more likely to be curious about all phases and their eventual preference is strongly influenced by early experiences that are largely unplanned and uncontrolled. Opportunities to specialize generally come along later, if at all. There does seem to be a tendency for employers to work a man into a specialized field if the employee is technically competent and at the same time not strongly inclined toward managing the activities of others. As in many phases of business life, natural processes sometimes bring about happy arrangements but too much is usually left to accident.

At the other end of the scale is

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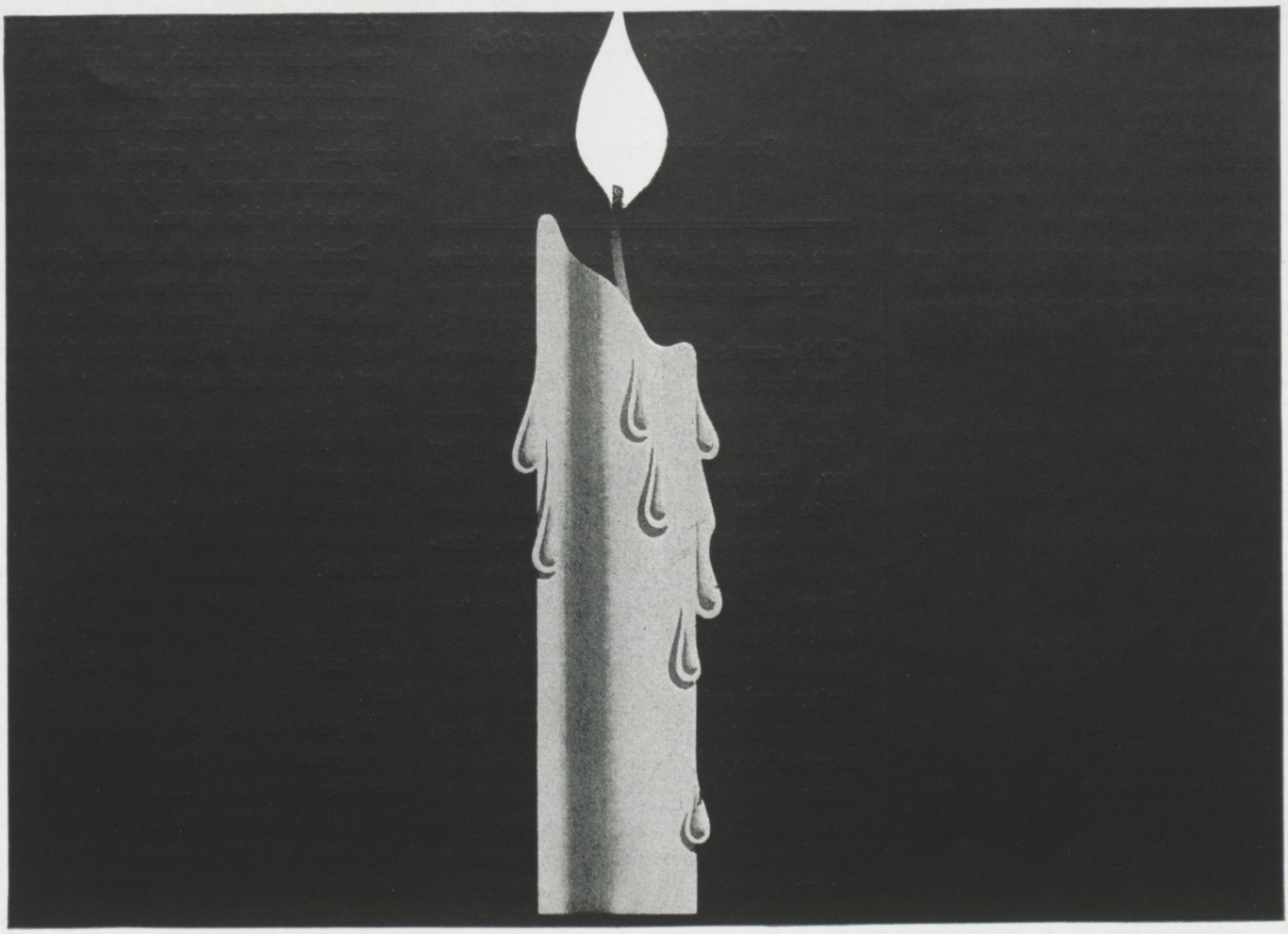

WAX WORKS . . .

Until a few decades ago, the principal users of wax were the candlestick makers. Today's diversified demands for wax put it in the class of modern industrial miracles.

Go into a super-market . . . see how wax works in the packaging and protection of milk and dairy products, cereals, bake goods, frozen foods. Think of its use in drug and cosmetic products . . . cups, crayons and carbon paper . . . polishes, preservatives and paper matches . . . And the number of industrial applications defies accurate calculation.

TOO BIG FOR BEES . . .

The ancients knew the physical properties of wax . . . and bees supplied the raw material. What then spurred this century's growth in production to more than a half-million tons a year?

The answer lies partly in the petroleum industry's desire to find more profitable applications for one of its products . . . partly in the desire of other industries to improve their processes and products.

AMERICA WORKS LIKE THAT . . .

Here, industry is paradoxical. It is independent, yet dependent . . . cooperative, yet competitive. It strives to make more money, yet is always seeking ways to keep costs and prices down.

And, to further these aims, management relies on the constant flow of information available through America's all-seeing, all-hearing and reporting Inter-Communications System.

THE AMERICAN INTER-COM SYSTEM . . .

Complete communication is the function, the unique contribution of the American business press . . . a great group of specially edited magazines devoted to the specialized work areas of men who want to manage better, research better, sell better, buy better.

COMMUNICATION IS OUR BUSINESS . . .

Many of the textbooks in which you are now studying the fundamentals of your specialty bear the McGraw-Hill imprint. For McGraw-Hill is the world's largest publisher of scientific and technical works.

After you leave school, you will want to keep abreast of developments in your chosen profession. Then one of McGraw-Hill's many business magazines will provide current information that will help you in your job.

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HEADQUARTERS FOR TECHNICAL AND BUSINESS INFORMATION

McGRAW-HILL FOR BUSINESS

Locker Rumors

(Continued from Page 22)

you ever played in a game where your own personal desire to win was the only incentive to victory? Ty Cobb carried that chip on his shoulder, but nine Ty Cobbs have never played on the same team at the same time! The more you have to play for, the more you want to win. Rose has a Prairie Conference championship at stake, but we haven't given them much reason to win. Laugh at the old raccoon coat and other throwbacks to the middle ages, but that 'coon coat is a symbol of a unity and spirit that is now predominently lacking at Rose. We have been cheap in our support of the team, cheap in the few cheers we've gven them, and more than cheap to the few non-student patrons who are brave enough to watch Engineers at home. When we learn to cheer for the team, we'll learn to enjoy football—win, lose or draw.

Hoop practice, says Coach Jim Carr will begin in a few days with the freshmen getting a little earlier start. Experts with the big ball returning from last year's squad, include co-captains Don Snape and Bob Young, Dick Gordon, Jim Blair, Walt Johanningsmeier, John Bloxsome, John Bizal, Dick Light, Harold Brown, and Bob Wertz. Four out of last season's first team are gone, so Coach Carr may have difficulty in duplicating the 14-6 record of the '53-'54 crew.

If you haven't taken advantage of the good word yet, get out and mix a little with the new intramural setup. We think it's the greatest thing to hit the campus since 'way back when Rosie was conceived, constructed, and dedicated. If you don't think that the program covers your likes in athletics, go down to the fieldhouse and check with Mr. Kelly. We'll cover all side bets that say it doesn't. You'll look a long time before you find a more interesting conductor of bull sessions than the new coach, and if you have an idea, you won't find a more receptive pair of ears than those belonging to this genial gentleman. Intramurals need only your support to break wide open.

Coming up on the new agenda is a horseshoe tournament beginning October 20. Games can be played any time, and judging from the number of horseshoes already checked out, interest will set an all time high. To enter the tournament, face the main bulletin board, execute a snappy about face, and take five steps forward. Confronting you will be the intramural bulletin board. Read ALL the material posted, then sign your name to the horseshoe list and anything else that looks important.

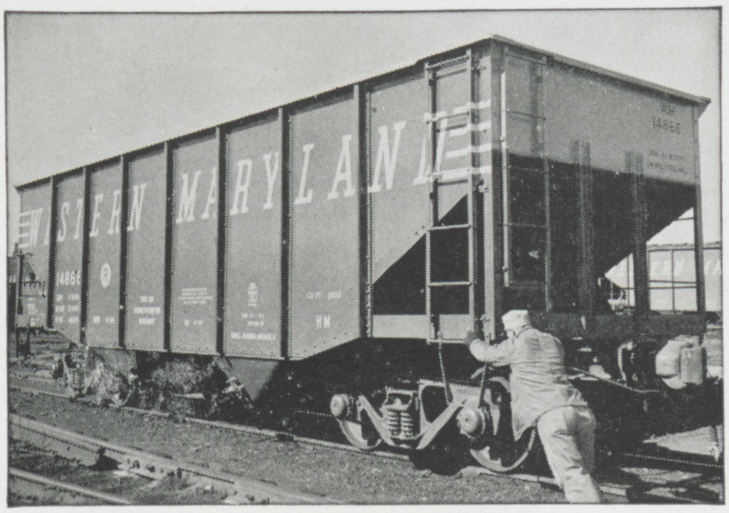
If you do this often enough, you'll find yourself in the thick of the fight for the all-sports participation award. This little gem will be worth working for. Although no exact value has been set to date, the winner will be given the run of McMillan's until his award runs out. If you need a new spinning reel, a couple of golf clubs, or some sportswear, get with it. Nobody has a better chance than you!

Already in session is the long-awaited touch football league. Due to a conflict between the Technic's deadline and the opening of the league, we have no results. Hang till next month and we'll give you the works in words and pictures.

The basketballs will begin bouncing on November 17 and remain lively until the Ides of March. This year the league will be split into two halves, running from the seventeenth to January 13 and February 2 till March 8. The winners of each half will meet for the league crown. Participation should be normal for Indiana and abnormal by national standards.

In the interfraternity football circuit, you tell us who's going to come out on top. Each brotherhood seems to have more than enough power in some department, so every game could be an upset. Ω

Another page for **YOUR BEARING NOTEBOOK**

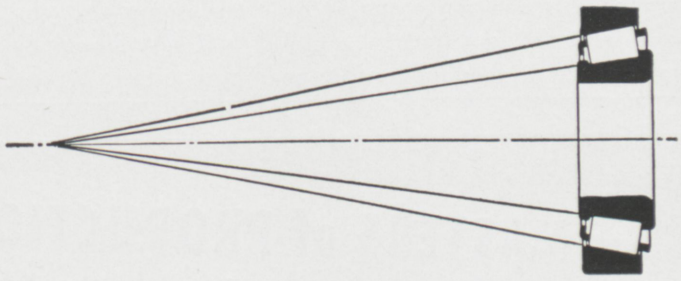


How to design a freight car one man can push

You can make a big 55-ton freight car roll so easily one man can push it. How? By mounting its axles on Timken® tapered roller bearings. Timken bearings *roll* the load, eliminate the metal-to-metal sliding friction that makes old-style friction bearings start hard. They reduce starting resistance 88%. And, with Timken bearings, there's no danger of hot boxes —the major cause of freight train delays.

TIMKEN® bearings are designed to roll the load

As you see here, all lines drawn coincident with the working surfaces of a Timken bearing meet at a common point on the bearing axis. This means Timken bearings are designed to give true rolling motion. And, since they're tapered they can take radial and thrust loads in any combination.



TIMKEN
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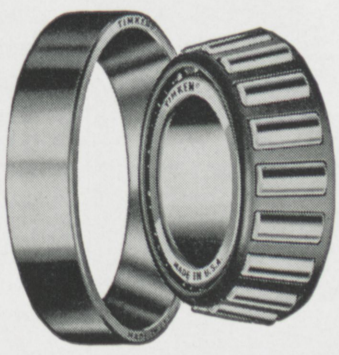
TAPERED ROLLER BEARINGS



Want to learn more about bearings or job opportunities?

Some of the engineering problems you'll face after graduation will involve bearing applications. For help in learning more about bearings, write for the 270-page General Information Manual on Timken bearings. And for information about the excellent job opportunities at the Timken Company, write for a copy of "This Is Timken". The Timken Roller Bearing Company, Canton 6, Ohio.

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⦶ AND THRUST ⊣⦶⊢ LOADS OR ANY COMBINATION ⦶

Will YOU Make a Good Engineer?

(*Concluded from Page* 11)

large company. After three months he quit. He could not stand the "atmosphere." He found men in their early twenties who were not interested in creating anything. Merely interested in their pay, their fringe benefits, and their old-age security, they were actually looking forward to the time when they could retire and quit working for a living. He told me that this atmosphere just got on his nerves, so much so that, although he was older than his colleagues and liked his particular job, he could not work there any longer.

One of the best examples of a successful industrialist, an engineer whom I knew in the old days, was Herbert Dow, the founder of the Dow Chemical Company. If one reads the history of this company, one is impressed with the fact that its founder not only was seemingly uninterested in personal profit, but in the profits for the company. He took the attitude that a company's growth depended on its ability to produce new products useful to the public at a price the public could afford to pay. He apparently reasoned that if one was successful in creating these new products at a price, the profits would come automatically — which they did. Today, the Dow Chemical Company stands out as one of the truly great creative and profitable enterprises. I doubt whether the late Herbert Dow ever envisioned the enormous growth that has taken place as a result of his simple and practical principle.

The same principle was applied by another old friend of mine, who started his first company with $243 when he was seventeen years of age, and developed an "empire" worth, at the time of his death, over $25 million. This man told me on several occasions that the love of creation, and not of money, was his guiding principle. He told me that large profits obtained in a single year through the sudden development of a new product were always embarassing to him, as his stockholders expected him to re-invest this sum immediately to make an equal percentage profit — something that usually cannot be done.

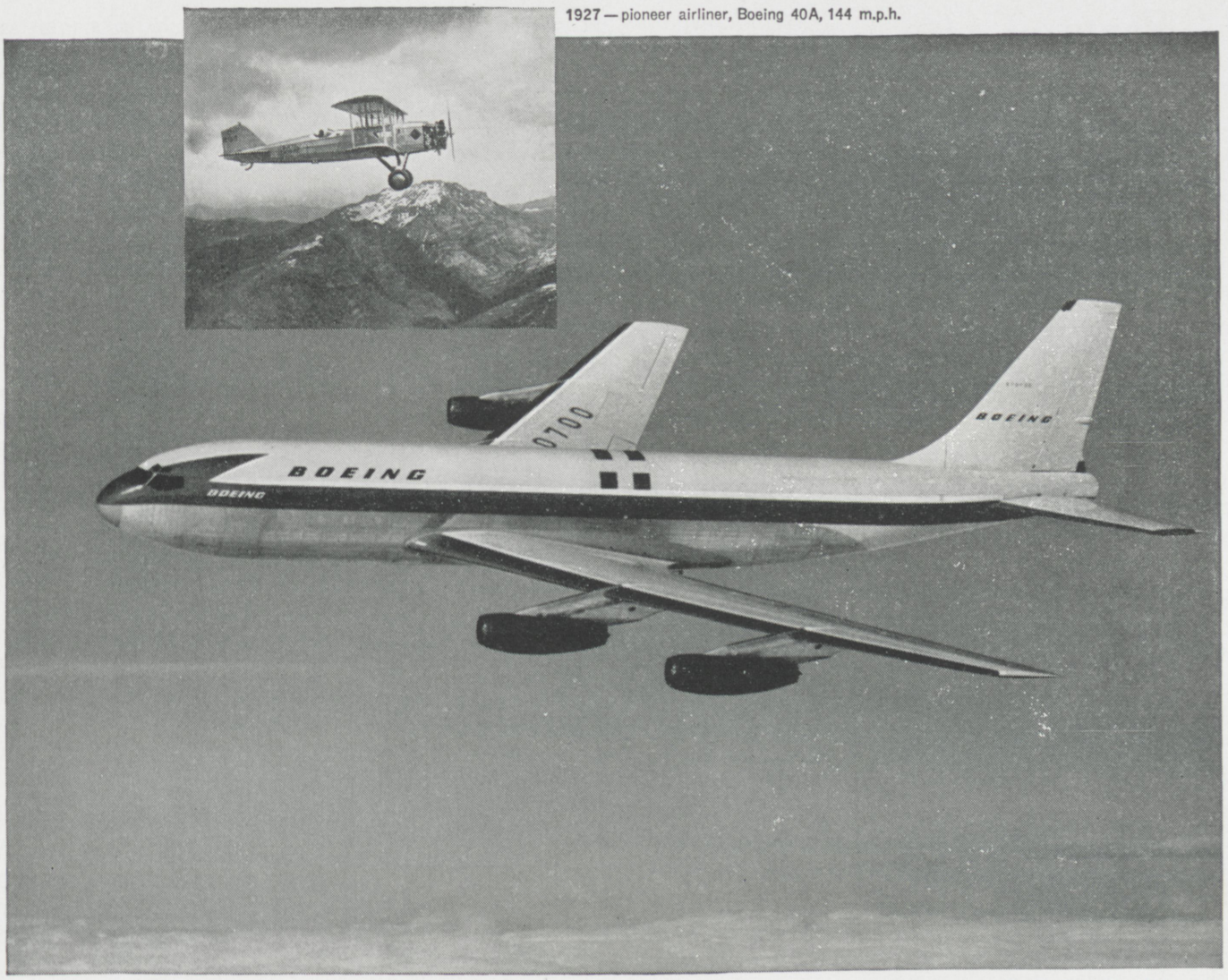
The enormous amount of energy Edison spent not only in creating but in promoting electrical engineering developments in order to satisfy the public is still appreciated. Many years ago the courts decided that the public is still appreciated. Many years ago the courts decided that the Edison patents on the moving picture machine were the basic ones, although three satisfactory moving picture machines had already been invented and developed by other persons prior to Edison's. But these three had been "abandoned." The court pointed out that Edison had not abandoned his invention but had spent an enormous amount of time, energy, and money in seeing to it that the public received the benefits. It was no more than human for the court to agree to give the credit to Edison rather than the prior inventors. Creation for the benefit of the public is what the public wants and incidentally, what they are willing to pay for.

One must not only love engineering, but use one's knowledge and energy for the creation of something that is directly or indirectly of benefit to all.

My suggestion to you who are graduating from our engineering colleges is to be certain when you discuss a position in industry to find out just what it is you are supposed to do on the job and then determine for yourself whether or not you would enjoy doing that particular type of work.

The capable young man with a sound educational background, with the desire to augment his knowledge throughout his lifetime, with a love for his work, and with an ardent desire to create for the benefit of mankind, should find unlimited opportunities in the engineering fields.

Do you really want to be an engineer? Ω



1927 — pioneer airliner, Boeing 40A, 144 m.p.h.

1954 — America's first jet transport, the Boeing Stratoliner, 550 m.p.h.

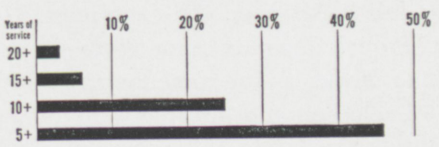
Two trail-blazing transports . . . both Boeings

America's pioneer transcontinental airline passenger plane, the 40A of 1927, was a Boeing. Today, America's first jet transport is another Boeing, the 707. This quarter-century of commercial design leadership is paralleled by military design leadership ranging from the old B-9 bomber to the fighter-fast Boeing B-47 and B-52 jet bombers of today.

For 38 years Boeing engineers have blazed exciting new trails in design, research and production. They're blazing them today in jet aircraft, guided missiles, and research in supersonic flight and the application of nuclear power to aircraft.

If such new-horizon engineering appeals to you, Boeing offers a rewarding career, whether you are in civil, mechanical, electrical or aeronautical engineering, or a related field. Boeing is expanding steadily, and employs more engineers today than even at the peak of World War II. Boeing also promotes from within, and holds regular merit reviews to give you individual recognition.

At Boeing you'll find an unusual range of opportunity, from applied research to production design, from work with new materials and techniques to contacts with a cross-section of industry through the company's vast subcontracting program. Boeing employs draftsmen and engineering aides to handle much routine work, thus freeing engineers for more stimulating assignments.



Boeing engineers enjoy stable careers —46% having been with Boeing for 5 years or more; 25% for 10, and 6% for 15. Many engineers have been here 25 years, and 7 have been with Boeing for 30.

Boeing helps engineers continue their graduate studies, and reimburses them for tuition expenses.

For further Boeing career information, consult your Placement Office, or write:

RAYMOND J. B. HOFFMAN, Admin. Engineer
Boeing Airplane Company, Wichita, Kansas

BOEING

SEATTLE, WASHINGTON WICHITA, KANSAS

Facts of Life For Young Engineers

(*Concluded from Page* 26)

the kind of person whose tastes and interests are catholic and who takes readily to the task of managing people and projects. Men who have real talent along these lines are eagerly sought by employers since the need is so great and because the financial consequences of good or inept management are so immediately and so strikingly apparent. It seems to be the case that only a very few men have well-developed management abilities in their early years and comparatively few ever develop these abilities of their own accord. There is great and rapidly increasing interest on the part of employers in methods for developing management talent. Generally speaking, the men who have been successful in the management line have attained very much higher remuneration and organizational stature than those who have developed only along technical lines.

The great majority of engineering graduates have grown up in environments that produce neither the man strongly oriented toward lone-wolf, highly technical activity nor the born manager. Most engineering graduates fall in-between the extremes. A great deal depends upon how soon a man works under someone capable of developing his abilities and correcting his faults. Employers are showing evidence of much improved understanding and handling of these matters and opportunities for planned, on-the-job development of men to meet industry's needs are increasing rapidly for engineering graduates as for others.

While there is room for more and better engineering technical experts and always a great demand for engineering-trained management experts, the great majority of engineering graduates must find their careers in the area between these extremes. The reasons for any particular individual spending his working career exactly as he happens to do are usually pretty complex. Almost all men are naturally indolent. Only the exceptional men are willing to work really hard without any special prodding from outside. Consequently, it is easy to stand out from the great mass of employees if you are less indolent than the average. If you have average ability and work really hard, you can progress rapidly. A question of habit, rather than any deep-seated aversion from work, is involved. Any young engineering graduate who puts work ahead of everything else will move along much faster than those who do not. Social pressures are against this. Generally, it is much like school-days. The devoted student sometimes fears ridicule. The fact is that there is a kind of enjoyment to be had from intensive application to your work that must be experienced to be appreciated. It beats athletics or spectator sports or purely social events, although these are fine in their place. The rank assigned to work will usually determine your fate more than any other single decision. Distractions are plentiful in the form of recreational activities, attractive young ladies and the like. While these have their own importance in the scheme of things, improper emphasis may prevent or fatally delay advancement opportunities.

Exercise in higher mathematics is of unquestionable value in training the mind and in developing understanding of the evolution of engineering theory but the language of practical engineering is simple arithmetic. We are indebted to the theorists that this is so and engineering practice as we know it would be impossible if this were not true. Engineering graduates, with very few exceptions, deal with matters that require more or less technical knowledge but which invariably, for best results, involve the application of "horse-sense." This means that they frequently must develop alternate courses of action and make a choice that is reasonable in the light of the known facts and the probabilities of the situation. The most successful people seem to be those who can make the best use of engineering knowledge rather than those who know most about theory. Independence of thought is an outstanding attribute of a high-type engineer. Carried to unwise extremes, however, "independent thinking" may put a man so out of step with his organization that his efforts are fruitless. What seems to be independence of intellect may actually be merely inability to see and employ the viewpoints of others. So much industrial thinking and decision making depends upon group effort that it is necessary to make one's own thoughts fit in with those of others to get complex problems solved. For success and advancement in even the most highly professional branches of engineering employment development of leadership characteristics is necessary.

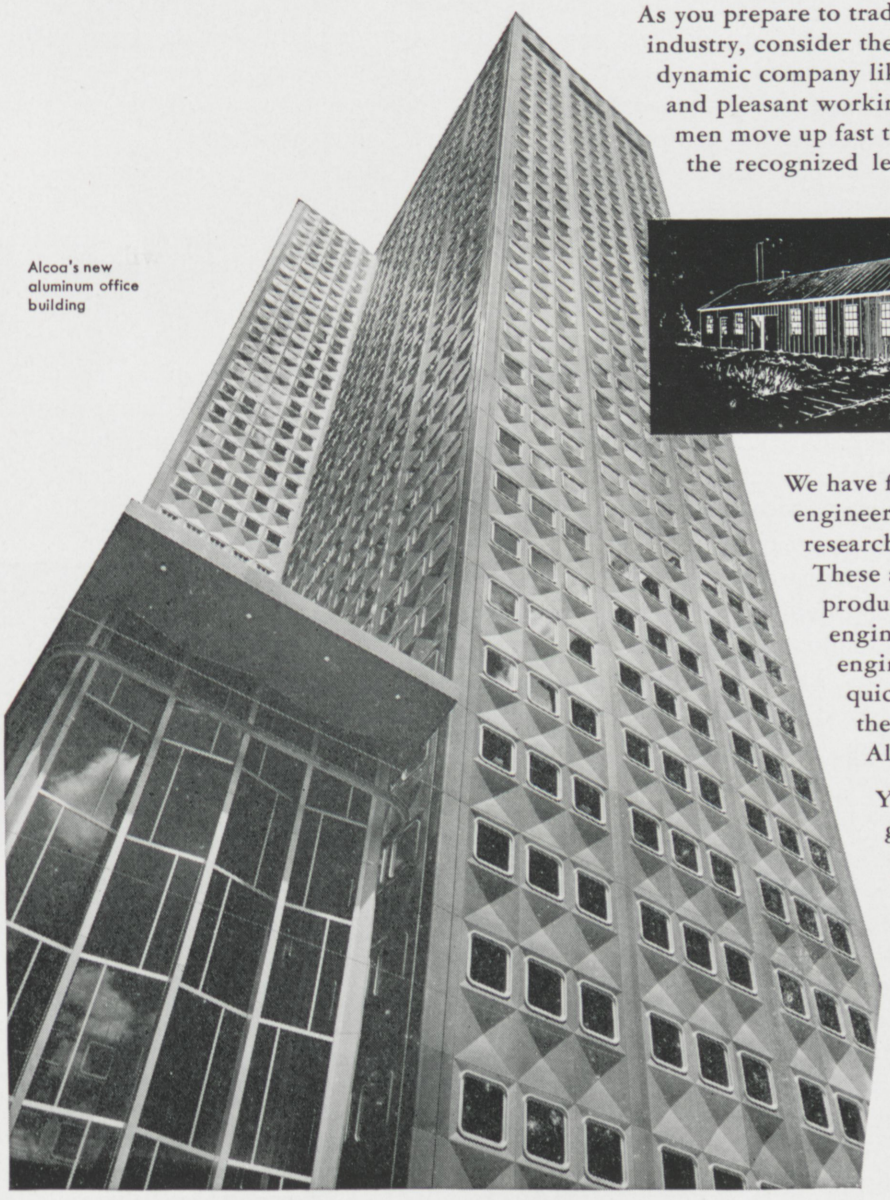
The graduating class in an engineering school comprises the survivors of a pretty selective process. Many have fallen by the wayside. Even so, the class will cover the entire gamut of academic accomplishment, from those whose grade-point average is near perfection to those who just squeak by. American industry is so complex that there are needs for all kinds of people who have the engineering background. In almost all jobs the man who learns how to be a good subordinate and a good teamworker, and how to make good decisions even though all the detailed facts are not available will get along much faster than the one who bogs down in detail because he is afraid of getting the wrong engineering answer in the absence of fully documented, precise data. Academic accomplishment is not the whole story behind success in engineering life. Comprehensive knowledge of engineering theory is a tremendous advantage and forms a firm foundation on which to build. Hard work leads to success and enjoyment. Identifying your goals and consciously working toward them is the best prescription for a happy life. Ω

THE ALUMINUM INDUSTRY WAS BORN ON SMALLMAN STREET

In 1888, the aluminum industry consisted of one company—located in an unimpressive little building on the east side of Pittsburgh. It was called The Pittsburgh Reduction Company. The men of this company had real engineering abilities and viewed the work to be done with an imagineering eye. But they were much more than that. They were pioneers . . . leaders . . . men of vision.

A lot has happened since 1888. The country . . . the company . . . and the industry have grown up. Ten new territories have become states, for one thing. The total industry now employs more than 1,000,000 people—and the little outfit on Smallman Street? Well, it's a lot bigger, too—and the name has been changed to Alcoa. ALUMINUM COMPANY OF AMERICA . . . but it's still the leader—still the place for engineering "firsts".

As you prepare to trade textbooks for a position in industry, consider the advantages of joining a dynamic company like Alcoa—for real job stability and pleasant working conditions—where good men move up fast through their association with the recognized leaders in the aluminum industry.



Alcoa's new aluminum office building

We have fine positions for college graduate engineers—in our plants, sales offices and research laboratories from coast to coast. These are positions of responsibility in production supervision, plant and design engineering, industrial research or sales engineering. Right now it may be quicker than you think from a seat in the classroom to your career with Alcoa. Why not find out?

Your Placement Director will be glad to make an appointment for you with our personnel representative. Or just send us an application yourself. ALUMINUM COMPANY OF AMERICA, 1825 Alcoa Bldg., Pittsburgh 19, Pa.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

Research & Development

(*Continued from Page* 13)

red, it is highly sensitive to all colors of visible light and on into the ultraviolet.

As a demonstration of the new cell, Kodak representatives have been exhibiting a small box that emitted squeals whenever the Ektron Detector on it "saw" the bit of hot ash on the end of a cigarette. It also squealed loudly when a flashlight was pointed at it with battery cells so weak that the lamp filament scarcely glowed.

In addition to its possibilities for heat detection devices and for the replacement of present types of "electric eyes" in rough service applications, the company also sees a strong potential for Ektron Detectors in automatic control of chemical processing plant operations and in complex electrical equipment where mechanical switching devices are too bulky, impractical, or insufficiently reliable.

In the chemical plant applications, the cells could automatically monitor the exact composition of fluids flowing through pipes and process vessels on the basis of the characteristic infrared "color" of the various components. Water and gasoline, for example, are both colorless liquids to the human eye but look entirely different to a sensitive infrared detector. Very fine differences between chemicals can be detected in this way.

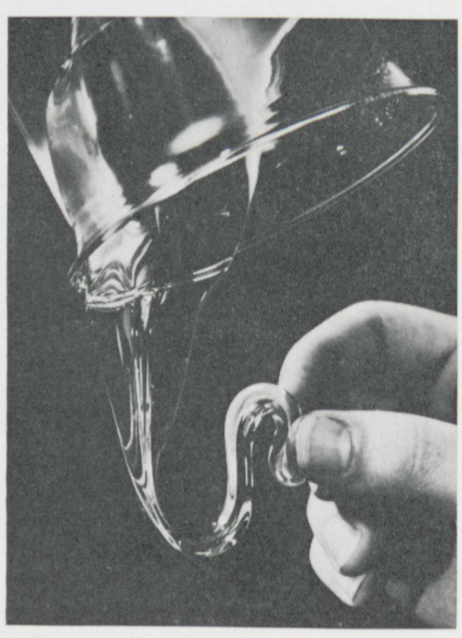
In the switch applications, say the Kodak engineers, the Ektron Detector permits a beam of light to eliminate a moving part. The "light", they point out, can come from a lamp operated so far below the rated current that the glow is invisible and lamp life is therefore unlimited. Ektron Detectors were shown at the convention June 14 in the form of multiple arrays of as many as 20 pinpoint specks of lead sulfide on less than an inch of glass. These are intended to operate complex combinations of electrical circuits in response to projected patterns of light or heat radiation.

Dow-Corning 400 Gum

In response to the requests of some leading rubber compounders, Dow-Corning Corporation is releasing one of its basic silicone rubber polymers. Identified as Dow-Corning 400 Gum, the polymer can be compounded with a wide range of fillers and vulcanizing agents to produce silicone rubbers suitable for a variety of applications.

Clear, uniform, and nontoxic, Dow-Corning 400 is a dimethyl silicone gum of high molecular weight and extremely high viscosity. Convenient and easy to handle with conventional compounding equipment, it is stable in storage and requires no preliminary breakdown. Williams plasticity is 45 mils; specific gravity at 25°C is 0.98.

(*Continued on Page* 36)



Silicone Rubber Polymer

"Allis-Chalmers Graduate Training Course Gave me a head start"

says GERALD SMART

Marquette University, BS—1948
and now Supervisor of Plant Engineering,
Allis-Chalmers, Norwood, Ohio, Works

"MOST MEN graduating from college don't have a clear idea of what they want to do. These individuals are helped by Allis-Chalmers Graduate Training Course to find the right job whether it be in design, sales, engineering, research or manufacturing.

"My case is a little different, however. I started the course with all my interest centered on tool design and 'in-plant' service. The reason is that I started getting vocational guidance from some very helpful Allis-Chalmers men back in 1940."

Served Apprenticeship

"At their suggestion I had gone to school part time while working full time. This not only gave me the chance to serve an apprenticeship as a tool and die maker, and earn money, but I learned what I wanted to do after graduation.

"Then came the war and service in the Navy. After the war I finished school. By the time I started on the course in 1948, I knew what I liked and seemed best fitted to do. As a result, my entire time as a GTC student was spent in the shops.

"The 18 months spent in the foundry, erection floor and machine shop have all proved valuable background for my present job.

"As supervisor of plant engineering at the Norwood Works, I am concerned with such problems as: Plant layout, material handling equipment and methods, new construction, new production methods to be used in building motors, centrifugal pumps, and *Texrope* drives. It's an extremely interesting job.

"From my experience, I'd say, whether you're a freshman or a senior it will pay you to talk to an Allis-Chalmers representative now. You can't start planning your future too soon. And you can't plan starting at a better place, because Allis-Chalmers builds so many different products that you'll find any type of engineering activity you could possibly want right here."

Facts You Should Know About the ALLIS-CHALMERS Graduate Training Course

1. It's well established, having been started in 1904. A large percentage of the management group are graduates of the course.

2. The course offers a maximum of 24 months' training. Length and type of training is individually planned.

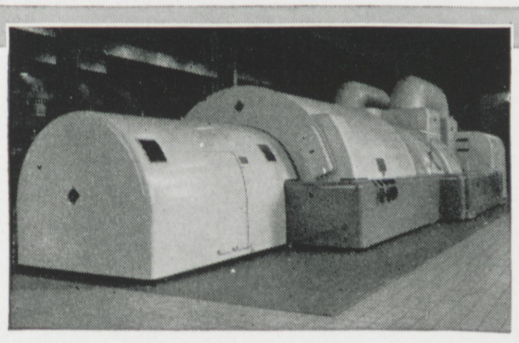
3. The graduate engineer may choose the kind of work he wants to do: design, engineering, research, production, sales, erection, service, etc.

4. He may choose the kind of power, processing, specialized equipment or industrial apparatus with which he will work, such as: steam or hydraulic, turbogenerators, circuit breakers, unit substations, transformers, motors, control pumps, kilns, coolers, rod and ball mills, crushers, vibrating screens, rectifiers, induction and dielectric heaters, grain mills, sifters, etc.

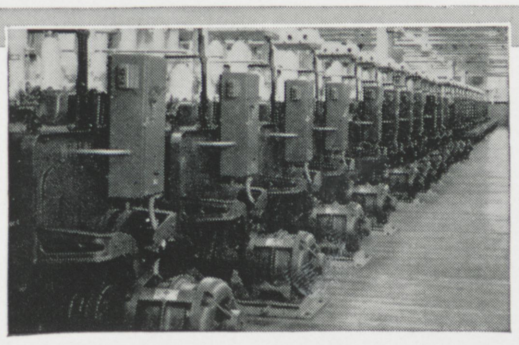
5. He will have individual attention and guidance of experienced, helpful superiors in working out his training program.

6. The program has as its objective the right job for the right man. As he gets experience in different training locations he can alter his course of training to match changing interests.

For information watch for the Allis-Chalmers representative visiting your campus, or call an Allis-Chalmers district office, or write Graduate Training Section, Allis-Chalmers, Milwaukee 1, Wisc.



Steam turbines, condensers, transformers, switchgear, regulators are built for electric power industry.



Motors, control, *Texrope* V-belt drives—all by Allis-Chalmers are used throughout industry.

ALLIS-CHALMERS

C-5678

Texrope is an Allis-Chalmers trademark.

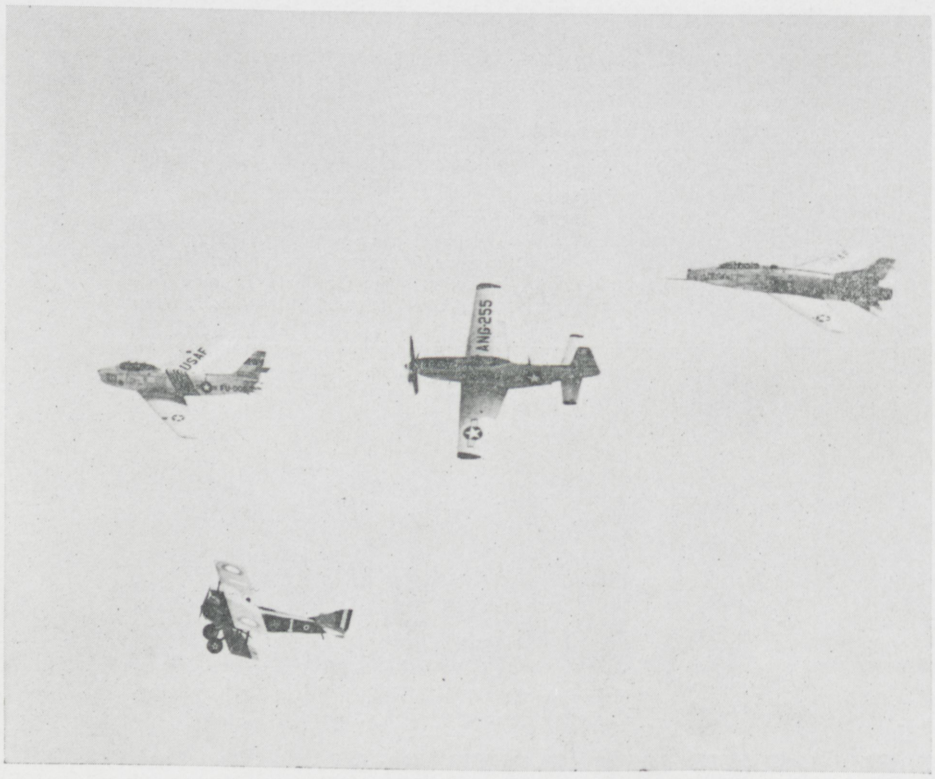
Research and Development

(*Concluded from Page* 34)

Heating a blend of Dow-Corning 400 and certain organic peroxide vulcanizing agents converts the mixture to a cross-linked, resilient mass. The selection of inorganic fillers and additives, however, determines to a large extent the physical properties of the finished elastomer. Careful compounding can produce stocks which meet AMS or SAE-ASTM Specifications or the requirements of military wire and cable insulation.

Four Generations Of Fighters

Top U.S. fighters of the past, present and future sat for their portrait recently at Nellis AFB, Nev., as a feature of the USAF's first all-jet gunnery meet. Circling around the 110 mile-an-hour Spad of World War I are the North American F-86 Sabre Jet, F-51 Mustang, top propeller fighter of World War II, and the new supersonic F-100, holder of the official world's speed record of 755 miles an hour.



From the Spad to the Super Sabre.

TV — on the wall

General Eltctric scientists envision the TV set of 1964 with a picture screen so thin that the complete unit could be hung like a painting on your living room wall. The circuitry would be built into the picture frame and would use printed wiring and miniaturized components. Controls would be located in a small box beside your easy chair.

Or for those who might prefer a table model, the thin picture screen would be mounted like a vanity mirror, attached to slender arms extending upright from a small oblong cabinet which would house the circuitry and controls.

These futuristic models, at least 10 years off, would receive color as well as monochrome pictures.

The POW, or "picture on the wall" TV receiver is just a glint in the scientists' eyes at the moment. But they are convinced such a unit can be developed and have designed a dummy receiver to help visualize the future TV unit which is pictured in the current issue of Collier's Magazine.

New Interference Microscope Measures To 100 Millionths of an Inch

The POW vision of the future stems from development work being done here on new miniature electronic components, and from a complex project underway to speed the plotting of aircraft in military filter centers.

At present, this aircraft plotting, essential to successful interception of enemy planes, is done manually. The planes are followed by radar operators and information fed to plotters who pin-point the planes with crayon on the transparent wall-size plotting board.

The plotting would be done automatically with the POW type of board.

The radar display system under development will use electronic computer circuitry techniques to convert a transmitted signal into an image on the plotting board.

The plotting board screen will be composed of a space matrix constituted by closely spaced perpendicular wire grids luminescing at their intersections to reproduce the transmitted picture.

Development of speedier switching techniques and new fast-reacting electroluminescent phosphors are needed before the POW system could be applied to television receivers.

ENGINEERS

or

PHYSICS GRADUATES

To those interested in advanced academic study while associated with important research and development in industry, Hughes offers two separate practical programs:

HUGHES COOPERATIVE FELLOWSHIP PROGRAM

for Master of Science Degrees

A program to assist outstanding individuals in studying for the Master of Science Degree while employed in industry and making contributions to important military work. Open to students who will receive the B.S. degree in Electrical Engineering, Physics or Mechanical Engineering during the coming year, and to members of the Armed Services honorably discharged and holding such B.S. degrees.

Candidates must meet entrance requirements for advanced study at the University of California at Los Angeles or the University of Southern California. Participants will work full time during the summer in the Hughes Laboratories and 25 hours per week while pursuing a half-time schedule of graduate study at the university.

Salary is commensurate with the individual's ability and experience. Tuition, admission fees and books for university attendance are provided. Provision is made to assist in paying travel and moving expenses from outside Southern California.

HOW TO APPLY

for the Hughes Cooperative Fellowship Program: Address all correspondence to the Committee for Graduate Study

University of Southern California

University of California at Los Angeles

THE HOWARD HUGHES FELLOWSHIPS

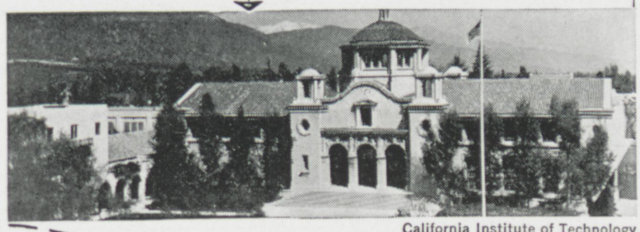
in Science and Engineering

Eligible for these Fellowships are those who have completed one year of graduate study in physics or engineering. Successful candidates must qualify for graduate standing at the California Institute of Technology for study toward the degree of Doctor of Philosophy or post-doctoral work. Fellows may pursue graduate research in the fields of physics or engineering. During summers they will work full time in the Hughes Laboratories in association with scientists and engineers in their fields.

Each appointment is for twelve months and provides a cash award of not less than $2,000, a salary of not less than $2,500, and $1,500 for tuition and research expenses. A suitable adjustment is made when financial responsibilities of the Fellow might otherwise preclude participation in the program. For those coming from outside the Southern California area provision is made for moving and transportation expenses.

HOW TO APPLY

for the Howard Hughes Fellowships in Science and Engineering: Address all correspondence to the Howard Hughes Fellowship Committee



California Institute of Technology

HUGHES

RESEARCH AND DEVELOPMENT LABORATORIES

Culver City, Los Angeles County, California

ADVERTISERS' INDEX

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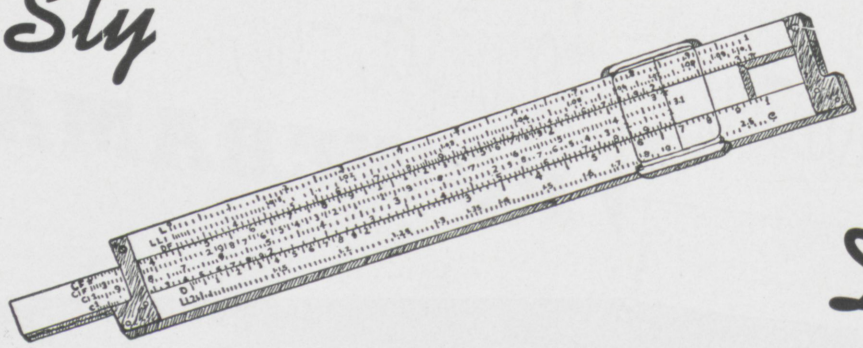

Droolings

When his usual "How-de-do" didn't do the job, the young wolf cried, "Oh, excuse me, I thought you were my mother."

The passing beauty snapped back, "I couldn't be. I'm married."

* * * * *

"My son," said the clergyman, "you'll have five minutes of grace before you go to the chair."

"That's not very long," replied the convict, "but bring her in anyway."

* * * * *

People who live in glass houses shouldn't.

* * * * *

Question: What makes some students wear hip-boots to class? Is it Fluids Lab or is it the professors?

* * * * *

Then there was the case of the young army doctor in the South Pacific who had diagnosed the ailment of a sergeant, but knowing he could do little with his limited facilities, he wired the base hospital: "Have case of beri-beri. What shall I do?"

The message was taken by a young technician at the base who wired back: "Give it to the engineers. They'll drink anything."

* * * * *

Both women and pianos are of the same brand.

Some are upright and some are grand.

* * * * *

D.P.: "She's a nicely reared girl, isn't she."

P.C.S.: "Not bad from the front either."

* * * * *

"I'll never forget the morning we first reached Niagara Falls," confided young Mrs. Jones. "My husband's face dropped about a mile." "You mean to say he was disappointed?" asked her close friend incredulously. "Not at all," Mrs. Jones assured her. "He fell over the rim."

* * * * *

A young school teacher said to her best student, aged seven, "Tommy, if I lay one egg on the table and two on the chair, how many will I have altogether?"

"Personally," answered Tommy, "I don't think you can do it.

* * * * *

Once a young college femme wrote the editor of a correspondence column, "I am only 19 and I stayed out till two the other night. My mother objects. Did I do wrong?"

The answer published in the paper next day: "Try to remember."

* * * * *

The young father to be, registering his wife in the maternity ward asked anxiously, "Darling, are you positive that you want to go through with this?"

* * * * *

Mrs. Jones was sitting in the breakfast nook shelling peas when she heard a knock at the door. Thinking it was her young son, she called, "Here I am, darling."

Silence. Then a deep voice boomed, "This is not the regular iceman, ma'am."

* * * * *

The man at the bar had just finished his second glass of beer and turned to ask the manager of the place, "How many kegs of beer do you sell in a week?"

"Thirty-five," the manager answered with pride.

"Well I have just thought of a way you can sell 70."

The manager was startled, "How?"

"It's simple, just fill up the glasses."

* * * * *

The local Sunday school teacher boarded the city bus. As she sat down in an empty seat, she thought she recognized the gentleman next to her and said hello.

He said nothing, but his distasteful glare told her she had made a mistake.

"Oh, excuse me," she murmured demurely. "I thought you were the father of one of my children."

* * * * *

Small boy writing answers to an anatomy test:

"Your legs is what if you ain't got two pretty good ones you can't get to first base—and neither can your sister.

PHOTOGRAPHY AT WORK—No. 10 in a Kodak Series

Photography took a look

and a harvester got a stronger set of teeth

John Deere engineers, building a new beet harvester, wanted spring-tooth disposal wheels with long life. High-speed movies showed the way.

The disposal wheels on the new John Deere beet harvester moved faster than the eye could see.

So the engineers studied them in action, slowed down by the high-speed motion picture camera. A small difference in design resulted in extra-long life for the spring teeth.

Slowing down fast action is but one way photography helps product design and manufacture. With x-rays it searches out hidden faults in castings, welds, and assemblies. And by photographing cathode ray traces, it discloses the causes of improper operation. These are but a few of the ways photography saves time, reduces error, cuts costs and improves production.

Graduates in the physical sciences and in engineering find photography an increasingly valuable tool in their new occupations. Its expanding use has also created many challenging opportunities at Kodak, especially in the development of large-scale chemical processes and the design of complex precision mechanical-electronic equipment. If you are interested in these opportunities, write to Business & Technical Personnel Dept., Eastman Kodak Company, Rochester 4, N. Y.

Eastman Kodak Company
Rochester 4, N. Y.

With the high-speed motion picture camera, John Deere engineers took pictures of their spring-tooth wheels in action at 3000 a second. Projected at the standard 16 frames a second, the motion was studied, slowed down to almost 1/200 of its actual speed.

Kodak
TRADE-MARK

LOOKING AHEAD WITH GENERAL ELECTRIC

In the next 10 years there will be more opportunity in the electrical industry than in all the 75 years since Edison invented his lamp

THREE quarters of a century after the beginning of the Age of Light, you might think that the Age of Opportunity in electricity had pretty well ended.

Exactly the opposite is true.

So many promising new ideas are now being developed that at General Electric we expect to produce more in the next ten years than in all the previous 75 years of our existence. Electronics, home appliances, the development of peacetime uses for atomic energy—these are only some of the fields where great progress will be made.

We know you will share in this progress whatever your career. Perhaps you will contribute to it.

Thomas Edison invented his electric light at age 32.

Progress Is Our Most Important Product

GENERAL ELECTRIC